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This study was conducted to evaluate the movement responses of four first grade boys to teacher-stated movement problems. A secondary purpose of this study was to design an objective and reliable tool for the observation of movement responses and to design an objective and reliable tool for the analysis of movement problems.

The study was conducted at The University Elementary School of The University of North Carolina at Greensboro over the second semester of the 1968-1969 school year. Two observers were used to observe the four subjects in physical education classes over a period of seven weeks or thirteen lessons. An objective and reliable tool was designed for the evaluation of movement responses. An objective and reliable tool for the analysis of movement problems on two criteria was also designed. The criteria for movement problems consisted of the limitation of the problem and the variety of response called for by a problem.

The results of the study were presented in the form of a case study for each of the four subjects. On the basis of this study the following conclusions were made:

1. All subjects worked the entire time available to them for a large percentage of the movement problems presented to them.
2. None of the subjects had a great ability to stay with relationships between movements in their responses that were demanded by problems.

3. All four subjects tended to produce more variety in their responses than was called for in problems that asked for only one solution, but inherently had many possible solutions.
4. Limited and unlimited problems, as defined in this study, affected subjects differently.
5. The subjects who produced more variety in their responses tended to respond better to unlimited problems.
6. The subjects who produced the least variety in their responses tended to be more concerned with the correctness of their solutions.
7. More variety of response was exhibited by all the subjects when problems were unlimited.
8. The tool designed for the evaluation of movement responses was objective and reliable.
9. The tool designed for the analysis of problems was objective and reliable.

AN EVALUATION OF THE MOVEMENT RESPONSES OF
FOUR FIRST GRADE BOYS TO TEACHER-STATED
MOVEMENT PROBLEMS

by

Judith Eleanor Rink

A Thesis Submitted to
the Faculty of the Graduate School at
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CHAPTER I

INTRODUCTION

Within the past few years education has become increasingly involved with the search to provide children with learning experiences which would involve the child in the process of learning how to learn. The concept of the child as a passive receptacle into which knowledges and skills are poured is no longer suitable for a rapidly changing society demanding a wide variety of abilities from its citizens. Terms such as problem solving, creativity, self-actualization, divergent and convergent thinking, and individualized instruction appear frequently in the literature. The teacher at all levels and in all areas of education is put in the position of providing learning experiences consistent with the findings of research and unfolding learning theories.

One of the most recent trends in physical education is an approach to elementary school physical education, originally conceived in England, known as movement education. Some American physical educators are looking to this approach as a means of providing a program that is child-centered and focused on the problem of learning how to learn. The attempted goals of movement education are to:

1. involve the individual totally,

2. allow each individual the opportunity to work at his own level and advance at his own rate,
3. encourage the development of self direction,
4. encourage the development of the child's creative potential and problem solving abilities. (5, 14, 20, 46, 58)

There is an inherent faith among advocates of this approach to elementary physical education that a child made to feel comfortable with his own movement patterns will gain the skill and confidence he needs to progress in his ability to move efficiently, effectively, and expressively.

The methodology used by movement education is primarily problem solving and exploration. The teacher guides the movement experiences of the child by presenting problems that vary in the amount of responsibility given the child to find a correct solution in movement. Most of the available research studies in movement education, using a variety of age levels and activities, have been concerned with the effectiveness of methodology on the attainment of some measurable specific movement skill. In most instances a problem solving and exploration method has been compared with an explanation-demonstration method. The problem of investigating the methods used in movement education can be attributed to the fact that the goals of movement education are more concerned with the process of learning than they are with measurable movement skills.

The most logical point from which to begin an investigation of this approach seems to lie in the area of a descriptive study which attempts to describe how the student is responding and to what. Taylor has suggested in regard to classroom teaching that

by using appropriate classification systems, one could start logging the responses of the teacher and the students to find out what thinking and learning processes in students are evoked by various behaviors and teaching methods of the teacher. (1:258)

The majority of investigations of the learning process and teacher effectiveness in the classroom have used some form of direct observation. Tools of many kinds have been developed to record and describe what is taking place. (4) The most fruitful observational studies in education have been concerned with teacher-pupil interaction recorded by classifying verbal responses. These studies have sought to give the educator guidance in determining the effect of teacher behavior on student behavior.

The quality of the student's response to a movement problem is of great concern to the movement educator. A review of available research in the area of movement education has exposed a need to investigate this relationship. The most suitable tool for such an investigation would appear to be direct observation. This study has been conducted to gain a deeper understanding of the way in which students are responding to movement problems. An understanding of the way students are responding should serve to give the teacher some direction in the presentation of movement problems.

CHAPTER II

STATEMENT OF THE PROBLEM

Statement of the Problem

The purpose of this study was to evaluate the movement responses of four first grade boys to teacher-stated movement problems. A secondary purpose of this study was to design an objective and reliable tool for the observation of movement responses and to design an objective and reliable tool for the analysis of movement problems.

Limitations of the Study

1. Only two observers were used to code movement responses.
One observer was responsible for the observation of one individual.
2. The number of subjects was limited to four selected first grade boys.
3. The study was limited to one teacher and one situation.
4. Data were collected for a period of thirteen consecutive lessons.

Definition of Terms

For purposes of this study the following definitions are made:

Movement education. An approach to elementary school physical education that uses a problem solving and exploration methodology and the movement framework of Rudolf Laban.

Problem solving. A teaching method that encourages an exploration, selection and refinement of solutions to movement problems presented verbally by the teacher.

Exploration. A teaching method that encourages an expansion of solutions to problems presented by the teacher which differ in the number of possible solutions.

Explanation - demonstration method. A teaching method that consists of an explanation and demonstration of what is to be done by the student.

Movement framework of Rudolf Laban. The principles and analysis of movement described by Rudolf Laban in terms of time, weight, space and flow.

Limitation of a problem. The amount of responsibility a student is given to find a solution to a problem in movement.

CHAPTER III

REVIEW OF LITERATURE

A review of literature in the area of movement education has been done with a particular emphasis on the aims, objectives and methodology of such an approach. Selected literature in problem solving and creativity has been reviewed with an attempt to gain some insight into current thought regarding the role of problem solving and creativity in achieving educational objectives. The close association of movement education with problem solving and creativity, particularly as they relate to this study, has necessitated a review of literature in those areas.

Literature dealing with the use of observation in the educational setting, the limitations of observation, and the methods involved in making observation a more reliable and objective method for obtaining data has also been reviewed.

Aims and Objectives of Movement Education

According to Locke, movement education entered the mainstream of physical education in the United States somewhere between 1958 and 1960. (20) Although still in the comparatively early stages of development, movement education has become identified as important in a changing philosophy of elementary physical education. (15)

The term movement education has been used by an array of authors to describe entirely different programs and concepts.

The term is most often used to describe a movement oriented and child-centered approach to physical education using a problem solving and exploration methodology, and the movement framework of Rudolf Laban. (15, 20, 46, 55, 58, 63, 65) The enthusiasm for such a program can best be attributed to the consistency of the methodology used with modern learning theories. These theories focus on the need to provide opportunities in creative thinking and problem solving as long term investments in the learning process, and a recent emphasis on individualizing instruction. (1, 15, 18, 25, 23, 28, 36, 37, 41, 44, 48, 50, 53, 58)

Inherent in the aims and objectives of a movement education approach to elementary physical education is an emphasis on the development of self-direction in addition to the development of creative thinking and problem solving abilities. There is also great emphasis on developing an awareness of the body, its capabilities for movement, and its relationship to the environment. (5, 14, 20, 22, 33, 46, 47, 58, 63, 65, 69) Movement education places a great deal of emphasis on the process of learning and the total involvement of the child in this process. The child is encouraged to explore and solve movement tasks at his own level in an environment that becomes progressively less teacher-directed and more child-directed. (14, 20, 33, 40, 47, 55) The quantity and the quality of the child's movement repertoire and his understandings of movement increase as the child is encouraged to solve movement tasks. (6, 57, 65)

Problem Solving and Exploration

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The use of the terms problem solving and exploration has, in most instances, been inconsistent in literature pertaining to movement education. Problem solving is used on the one hand to convey the entire idea of interrogative movement tasks to be answered in movement, (6, 14, 59) and on the other hand to mean a specific type of problem that causes an exploration, selection, and refinement of possible solutions. Mosston referred to problem solving as the presentation of a problem which, ". . . seeks to develop the ability to find alternatives, explore them, and select appropriate ones." (21:183) Exploration has been defined as a ". . . method for teaching movement whereby the individual is guided through progressively less teacher-directed and more child-directed experiences." (40:28)

The emergence of an emphasis on problem solving and learning by discovery has led learning theorists to an investigation of the "cure-all" manner in which educators have grasped such an approach. Research studies that could support or not support the many claims of this "right way" to learn have been delayed due to a lack of measuring instruments and complicated variables.

Theorists have speculated that this special kind of learning might be useful in only special circumstances when ". . . students have already learned the necessary prerequisites and few competing responses," (25:44) and when concepts rather than single generalizations are to be learned. (25:42) It has also been speculated that some learners might benefit a great deal more than

others, and that a dependent individual might even be ". . . paralyzed by demands for self-reliance." (25:90) The over-achievers in a school are likely to look for the one "right answer." (36:26)

Creativity

There is reason to believe that thinking and learning creatively are very much associated with the child's opportunities to participate in problem solving. (29:47) One particular study done by Torrance indicated that creative movement did improve creative thinking. (53) Stroup and Pielstick found motor ability and creativity to be independent of each other. (52) There seems to be a low but positive relationship between measures of creativity and intelligence (56:25, 52:26), and general agreement that the creative potential of children can be developed in the teaching-learning process. (1, 31, 41, 50, 53)

Wyrick attempted to devise a test to measure motor creativity, operationally defined as, ". . . the ability to produce both varied and unique responses to a given stimulus in conjunction with the ability to produce original motor responses." (55:756) Creativity was divided into the fluency, or number of responses, and the originality of the motor responses relative to the college students participating in the study. A high correlation between motor fluency and motor originality was obtained.

Interest in the creative process by physical educators and by those people working with movement education has been consistent with the recent surge of interest in creativity in all

areas of education. (50) Movement education is said to contribute to the release and development of the child's creative potential. (20, 55) Unfortunately, the term creativity has become a catch-all term for many undefined processes. Most authors agree however, that creativity does imply the process of expanding ideas and the production of something new and divergent. A difference of opinion exists as to whether the uniqueness or originality of what is produced is to be measured in terms of the individual or in terms of his relationship with a group. (24, 72)

Problem Solving and Exploration in Movement Education

Movement education usually involves the presentation of movement tasks or problems by the teacher to be answered in movement by the student. (6, 14, 33, 47, 58, 68) These problems can be structured so as to expand or restrict the possibilities for solutions. (55, 59) Barrett referred to this characteristic as the degree of discipline of a problem and described a more disciplined, disciplined and less disciplined problem; providing a minimal, medium and maximum freedom for exploration. (58:30) Bilbrough and Jones referred to the direct, indirect, and limitation method to imply a range of restrictiveness open to a teacher in presenting problems. (8) A continuum of teaching methodology going from teacher-directed to child-directed experiences was described in a publication of the Plattsburgh Movement Education Project. (22)

The limitation of movement tasks varies in one lesson according to the objectives of the teacher. (20, 58) The more specific the objective, the less opportunity a teacher is likely to give the child to explore. (46, 58) One lesson is very likely to have a range of problems going from most limited to least limited in the freedom the problem gives the student to choose a response.

The teacher must be sensitive to how the student is responding and to what. The importance of knowing when to limit problems and when to expand them is vital if the objectives of such a method are to be met. The child who stays with one solution when a variety of solutions is called for, is not exploring the wide range of movements of which he may be capable, or becoming familiar with a variety of skills. Unstructured problems, continually giving the child complete freedom of response, could possibly serve to deter the development of quality in movement. (20, 26) In order to provide direction for progression and structure of future work, an evaluation of how correct the student's movement responses are in relation to what the problem demands and the quality and variety of those movement responses is a necessity. (58:78)

The content material for the presentation of problems usually is based on the movement framework of Rudolf Laban. (5, 14, 20, 58) Lessons are presented around themes of where the body can go, what the body is doing, and the quality of movement described in terms of time, weight, space and flow. (14, 58)

Research Done in Movement Education

A great number of studies have been done comparing a problem solving methodology with a more formal explanation-demonstration approach to teaching physical education. Russell (71) and LaPlante (66) investigated the use of problem solving with college age students in the skills of softball and bowling respectively. Russell concluded that the difference between the two methodologies was insignificant when the windmill pitch was used as the criterion. (71) LaPlante concluded that although both groups improved significantly when bowling scores were used as the criterion, there was no difference between the two groups. (66)

Richardson studied the effects of a modern educational gymnastics approach on the body concept of college women. No significant difference was found between the groups in body concept. A significant difference in body concept was found after eleven weeks of instruction for the experimental group. There was no significant difference between the scores of the two groups on a proficiency test administered at the conclusion of instruction. (70)

Studies done with primary age students have been concerned with the effects of methodology on static and dynamic balance (72), selected motor skills (62), motor development and creativity (49), academic school achievement (39), and ball handling skills. (64) Results have been inconclusive. Howard concluded in an investigation of ball handling skills that when skill performance was the only criterion the results were not clearly in favor of either

methodology. (58:65) Similar results were reported by Scott when perceptual motor and physical fitness were the criteria. Scott did conclude, however, that a more informal method showed significant gains in a measure of creativity. (49) Shochat concluded that there were significant gains for both a traditional and movement exploration methodology for static and dynamic balance. The difference between the two methodologies was significant in favor of movement exploration. (72)

Observation

Direct observation has been widely accepted as a method of studying teacher behavior and student behavior. (4, 9, 27) Observation has been, in fact, the primary method of studying the behavior of students in the classroom, teacher effectiveness and teacher-pupil interaction. (4, 17) The concentration has been on the classification of behavior. (34, 51) Boyd indicated that this concentration, ". . . reflects the heavy emphasis placed on verbal behavior in classroom learning situations." (34:542)

Observation is limited by several factors: the inability of the observer to see objectively even if he can record objectively (12:65); the influence that an observer has on those being observed (32:117); inaccuracies of recording and the ability to focus on only a small part of the total situation (35:339), and the personal biases of the observer. (7:3) Methods of observation have been designed to reduce the limitations of observation and make it possible to gather data useful to the formulation of new concepts and relationships. (35, 45)

Observation can be considered in terms of two basic observational systems, the open and the closed system, or the structured and unstructured system. (12, 34) The open system attempts to take in and record everything that is taking place and the closed system assigns behavior to descriptive categories for a fixed period of time. In a closed system actual behaviors are lost in categorical analysis. (12) Limiting the range of what is to be observed makes possible more accurate and detailed information, in spite of the fact that analytic units and categorical check lists ". . . tend to miss subtle details of interaction because of the limited categories used." (4:23)

In constructing a tool for observation, one must decide: the range of behavior to be studied; whether the intent of behavior, its objective characteristics or its effects will be recorded; whether categories will be descriptive or evaluative, exclusive or inclusive, discrete or continuous; and the level and intensity of the categories to be used. (27, 35)

Two prevalent closed systems which have been used in classroom observation have been the time sampling technique and the trait ratings technique. (12:91) When using the time sampling technique the observer watches for only a short period of time and uses either a single frequency count or a single incident count of behavior. (12) The trait rating technique attempts to record the degree to which a particular characteristic or trait is present in behavior. (19) Time sampling techniques have increased the ease

of observation but have been criticized because of the limitation of what is observed. (35:343)

Descriptive categories used for observation tools must be noninterpretive descriptions of overt behavior. (34:535) The interpretive and inferential stages of the categories used must be made before the data are collected. (34:535) Categories must be well defined, appropriate for the needs of a particular study, based on a single classification principle, and defined by using behavioral examples from the data that distinguish boundary lines. (16, 24, 34)

The objectivity of the observation tool is generally agreed to be agreement between observers who observe independently and simultaneously. (32:119) The reliability of an observation tool is generally accepted to be agreement between repeated observations of the same subjects under the same conditions. (35) Audio-visual recordings, which preserve and can replicate the behavioral incident increase the reliability and validity of observation. (32, 35)

Observation may be enhanced if:

1. . . . specific and unequivocal definitions are used,
2. observers are well acquainted with the observation tool,
3. behavior is recorded immediately or shortly after assessment, and
4. the observer recognizes and attempts to suppress personal biases. (4)

Few observational studies have appeared in physical education. Bookhout classified teacher behavior in an attempt to determine the social-emotional climate of a class of ninth grade

students. Bookhout concluded that teachers who moved freely among students while they are working in the gymnasium tended to produce a more supportive climate. (60:89)

Summary

Literature in the area of movement education reflected a consistency in ideas in spite of an inconsistency in the use of terminology. Advocates of movement education regarded a problem solving and exploration methodology as an opportunity to involve the individual student totally in the movement experiences at his own level, increasing the quality and quantity of his movement repertoire. The teacher's skill reflects her ability to design appropriate movement tasks which differ in the amount of responsibility given the student to respond in movement. Available research in movement education primarily concerned itself with the development of measurable movement skills.

Literature in the area of observation in the educational setting reflected the wide use of observation to study teacher behavior, student behavior, and interactions that would be most difficult to study with other measurement tools. Attention to observation techniques and principles acquired through the experience of other observation studies can make observation useful in obtaining objective, valid and reliable data.

CHAPTER IV

PROCEDURE

The purpose of this study was to evaluate the movement responses of four first grade boys to teacher-stated movement problems. A secondary purpose of this study was to design an objective and reliable tool for the observation of movement responses and to design an objective and reliable tool for the analysis of movement problems.

The study was conducted at the University Elementary School of the University of North Carolina at Greensboro during the second semester of the 1968-1969 school year. Data were collected for a period of seven weeks or thirteen lessons.

Selection of Subjects

Since most students are active at the same time and in different ways when a movement education approach to elementary school physical education is used, recording and observing a group response would be difficult and deceiving. Recording individual responses limits the number of students that can be observed in any given time period. For the purpose of this study it was decided to limit the number of subjects to four in order to obtain more accurate and extensive information.

The use of a movement education approach to elementary school physical education to meet the needs of young children

is more often questioned in regard to boys than it is in regard to girls. It was, therefore, decided that boys would be used as subjects for the purpose of this study. It was assumed that social relationships which develop among members of a class would not interfere significantly with true individual responses for the first grade child as they might for an older child. Therefore, first graders were selected.

A meeting was arranged with the first grade teacher at the University Elementary School in January 1969. After the purpose of the study was explained, she was asked to select boys whom she would classify as having: (a) above average school achievement and above average maturity, (b) average school achievement and average maturity, and (c) below average school achievement and below average maturity. A list was obtained with two boys in each of the three categories.

The list of possible subjects was given to the physical education teacher. From that list she was asked to recommend one student from the first category whom she considered high in motor ability, two students from the second category who were considered average in motor ability, and one boy from the third category who was considered below average in motor ability. All judgments were subjective.

Methods and Criteria for Observation

Observations were made for a period of five classes to determine criteria for observation and possible methods of

obtaining data. Two different tools were needed--one to code the movement responses of the subject and one to record and code the problems presented by the teacher. It was decided that the problems presented by the teacher would have to be recorded word for word in order of occurrence and coded after observation. Judgments could then be made with more time for deliberation. It was also decided that the movement responses of the child would have to be coded immediately following the time allotted for a problem. In coding responses immediately the exact movement responses would be lost (24), but efficiency of observation made this a necessity.

Consistent guidelines for the recording of problems needed to be established. It was decided that:

1. if the same problem was restated by the teacher before the students had the opportunity to work on the problem it would not be considered a new problem;
2. if the teacher posed a new problem before the students had an opportunity to work on the previous one, responses to the previous one would not be considered;
3. if a new aspect of a problem was presented during the course of the child's work it would be considered a new problem;
4. if the teacher was using a sequence of verbal commands that moved quickly from one to the other, they would be considered as one problem.

One observer could not record more than one student at one time accurately. Since two subjects would be participating in the same class at the same time at least two observers were needed. A graduate student at the University volunteered to participate as a second observer.

The selection of criteria for observation of movement responses was limited by the time the observer would have to consider behavior. Four criteria were selected to give an indication of the quality of involvement:

1. involvement - the ability of a child to stay with a problem in its entirety and not lose focus of what he is trying to do,
2. variety - the number of solutions a child finds to a problem,
3. correctness - the appropriateness of the child's individual movements in relation to what the problem demands,
4. skill level - the difficulty of the movement the child attempts and the level of control of that movement.

Several decisions were made regarding the behavior to be studied. Overt descriptions of behavior rather than the intent of behavior were to be recorded since intent could not be determined objectively. Behavioral responses would be considered responses to the problem presented by the teacher. It was recognized that these responses could not be considered independent of causes other than the presented problem. Behavior

would be recorded for the entire time the teacher allotted for a problem. Obvious incidents which prevented the child from responding to a problem, such as tying a shoe or waiting for a piece of equipment, would not be evaluated as a response. An evaluation of the criterion of skill level would be made on the basis of accumulated knowledge of the student's skill through observation previous to the use of the scale.

Observation Tool for Movement Responses

A preliminary tool for the observation of movement responses was designed based on the selected criteria for quality of involvement. The preliminary tool was used for a trial observation period of five weeks or ten lessons. The objectivity and reliability of this tool was tested. Needed revisions became evident and a revised tool was designed and used for a period of seven weeks or thirteen lessons for the collection of data. The following section discusses both the preliminary and the revised tool.

Preliminary Tool for the Observation of Movement Responses. A continuous scale of behavioral categories was developed for each of the four criteria selected as basic to the quality of involvement of the student's movement responses. A recording sheet corresponding to each of the criteria and categories was designed to code responses with checks in appropriate columns.

Video tapes were made of four lessons in which the subjects were participants. A Sony Video Tape Outfit NO.VCK 2100 was used to record the lessons. The camera with a zoom lens followed one student through an entire lesson.

Judges were selected on the basis of their interest in the study. Three faculty members volunteered their services to act as judges. The two observers used for the study also acted as judges. Out of a team of five judges, two judges had had no actual experience working with a movement education approach to elementary school physical education.

The first taped lesson was used to instruct the judges in the use of the observation tool. During the instructional period it was decided that the microphone used for recording the lessons was not picking up the teacher's voice clearly enough to enable the judges to record the problems. Problems were written out and a copy of the problems was given to each judge for the second session. The judges used the observation tool to code the movement responses of the children shown on the remaining three taped lessons.

A total of forty-two problems were included in the three lessons. Intercorrelations among the five judges on the first observation were considered to be evidence of the objectivity of the observation tool. Intercorrelations were computed using Pearson's product-moment coefficient of correlation. Intercorrelation coefficients for the five judges ranged from .73 to .85.

One month after the judges used the preliminary tool to code the movement responses of the children shown on the three taped lessons, they recorded their observations of the same lessons a second time. Evidence of the reliability of the tool was accepted as being agreement between the first and second observation of each judge. Pearson's product-moment coefficient of correlation was used

to compute the correlation coefficients between the first and second observation of each judge. Correlation coefficients computed for reliability of the observation tool averaged .62. The tool was rejected as being not reliable.

The preliminary tool to code the movement responses of the subjects had been used by the observers for a period of five weeks or ten lessons. Weaknesses in the tool became evident. Criteria were not defined clearly enough and were not independent of each other. The categories that were used did not adequately distinguish boundary lines between behaviors. The failure of the preliminary tool to be reliable was attributed to these factors. It was also felt that a lapse of one month between observations for the judges necessitated an instructional review in the use of the tool. The judges did not have an instructional review before the second observation.

Revised Tool for the Observation of Movement Responses. A revised tool was designed to correct weaknesses in the preliminary tool. The criterion of involvement was separated into two criteria; the time the child spends on his interpretation of the problem out of the time available to him and the ability to stay with relationships between movements and combinations of movements that were demanded by a problem. Categories were redefined into more specific descriptions of behavior. The skill level criterion was omitted from the new tool. Skill level was felt to be very important to any evaluation of quality of involvement but too difficult to determine objectively for this study. A copy of

the revised tool and the accompanying recording sheets appear in Appendix A.

Two additional lessons were video taped to be reviewed by the same team of judges using the revised tool for the observation of movement responses. The changes in the tool were explained to the judges. The judges coded the movement responses of the two subjects shown on the two taped lessons using the revised tool.

Eighteen problems were included in the two taped lessons. Intercorrelation coefficients between the judges for the first observation were computed as evidence of the objectivity of the revised tool. The small number of problems required the use of the Spearman Rho coefficient of correlation technique. The DuBois formula for dealing with tied ranks was used to eliminate some of the error involved with ranks that were tied. (13:230) Intercorrelation coefficients obtained for the judges on the revised tool appear in Table I. Judge "E" misinterpreted the numerical values assigned to one of the categories. It was decided that intercorrelation coefficients obtained for this judge would be eliminated. Intercorrelation coefficients for the remaining four judges ranged from a .76 to a .91. Three of the judges had intercorrelation coefficients above a .85. All coefficients obtained were accepted at a one per cent level of confidence. (13) The intercorrelation coefficients obtained for the four judges were accepted as being evidence of an objective tool.

Three days after the judges used the revised tool on the two taped lessons, they recorded their observations of the same

TABLE I
INTERCORRELATION COEFFICIENTS OBTAINED FOR THE
OBJECTIVITY OF THE REVISED OBSERVATION
TOOL FOR MOVEMENT RESPONSES

N = 18

	Judge A	Judge B	Judge C	Judge D
Judge A	X	.86*	.90*	.76*
Judge B	.86*	X	.91*	.77*
Judge C	.90*	.91*	X	.77*
Judge D	.76*	.77*	.77*	X

*Significant at the one per cent level of confidence.

two lessons a second time. Coefficients of correlation were computed using the Spearman Rho coefficient of correlation technique. The DuBois formula for dealing with tied ranks was used to eliminate some of the error involved with ranks that were tied. (13:230)

The coefficients of correlation obtained as evidence of the reliability of the revised observation tool appear in Table II. The coefficient obtained for Judge "E" was a .74. Since Judge "E" had misinterpreted the numerical values assigned to one of the categories in the first observation, the correlation between her first and second observation was not expected to be high. The coefficients of correlation obtained for the other four judges ranged from .84 to .93. Coefficients obtained for three out of the four judges were above a .90. All coefficients were

TABLE II
CORRELATION COEFFICIENTS OBTAINED FOR THE
RELIABILITY OF THE REVISED OBSERVATION
TOOL FOR MOVEMENT RESPONSES

N = 18

Judge	r
A	.90*
B	.93*
C	.95*
D	.84*
E	.74*

*Significant at the one per cent level of confidence.

accepted at the one per cent level of confidence. (15) The coefficients of correlation for all but Judge "E" were accepted as being evidence of a reliable tool.

Analysis of Movement Problems

The writer experimented with many methods of obtaining a numerical rating of the limitation of a problem. Initially, an attempt was made to treat limitation as a single factor and to develop a continuous scale into which all problems would fall. The categories for this method were based largely on the literature dealing with the opportunity the teacher has to expand or restrict the possibilities for exploration in presenting movement problems. (5, 21, 22, 58) It became obvious that more than one factor was

responsible for the limitation of a problem and that one continuous scale would not be appropriate.

An attempt was made to analyze the limitation of a problem in terms of the movement components of Rudolf Laban. This analysis identified many factors of limitation but excluded those factors not directly related to Laban's analysis. How much freedom a child is given to choose equipment is an example of a limitation that would be excluded by such an analysis.

It was decided that a method of analyzing problems that was more general and did not attempt to define and categorize each specific limitation would better meet the needs of this study. It was also decided that the variety of responses called for by a problem should be treated separately from the limitation of a problem. This would facilitate the comparison of the variety of responses called for by a problem with the variety of responses exhibited by a subject to a problem.

Three factors were isolated as contributing to the limitation of a problem:

1. the movement the child was asked to consider,
2. the description of how this movement was to be done,
3. the relationships between the movement responses with which the child was asked to work.

The first factor was considered the root of the problem or the verb in the sentence that indicated what movement was to be done. The second factor was considered the focus of the problem and consisted

of the word or words which described how the movement was to be done. The third factor was considered to be combinations of more than one root. A problem could have more than one root and more than one focus. The complete method used for the analysis of movement problems is described in Appendix B.

General categories for each of the factors identified were designed and point values were assigned to each category. The total limitation of a problem was considered to be the addition of the point values accumulated for each category. It was recognized that more subtle ways of limiting problems which occur during any one class that have not been considered using this type of problem analysis. How the teacher has used a term prior to the presentation of a problem and the child's previous experience with a term undoubtedly do much to affect the child's interpretation of the limitation of a problem. It was also recognized that this method of analysis assigns a greater numerical value to problems that are verbally more complicated, but it was assumed that complexity in itself is a limitation for the first grade child.

Four categories were developed to classify the variety of responses called for by each problem. A numerical value was assigned to each of the categories. These categories are described in Appendix B. The numerical value obtained for the variety of responses called for by each problem was considered separately from the numerical value obtained for the limitation of a problem.

Twenty problems from the study were selected to be a representative sample of the types of problems that would have to be

analyzed by the investigator. These problems, along with a description of the method used for problem analysis, were given to four of the judges for the evaluation of movement responses. The judges were asked to study the directions for analysis and then to analyze the twenty representative problems. A copy of the twenty problems presented to the judges appears in Appendix B.

The judges returned the analysis of the twenty problems to the investigator. Intercorrelation coefficients among the judges for the first analysis were accepted as being evidence of the objectivity of the method of analysis. Intercorrelation coefficients were computed using the Spearman Rho coefficient of correlation technique. The DuBois formula for tied ranks was used to eliminate some of the error involved with ranks that were tied. (13:230)

Intercorrelation coefficients among the judges appear in Table III. Coefficients of the four judges ranged from .61 to .93. Three out of the four judges had intercorrelation coefficients above .80. Therefore, intercorrelation coefficients among the judges were accepted as being evidence of an objective tool for the analysis of movement problems. All the coefficients obtained were significant at the one per cent level of confidence. (13)

A time period of from seven to twelve days lapsed before the same judges were asked to analyze the same set of twenty

TABLE III
INTERCORRELATION COEFFICIENTS OBTAINED FOR
THE OBJECTIVITY OF THE METHOD OF
PROBLEM ANALYSIS

N = 20

	Judge A	Judge B	Judge C	Judge D
Judge A	X	.82*	.93*	.69*
Judge B	.82*	X	.87*	.63*
Judge C	.93*	.87*	X	.61*
Judge D	.69*	.63*	.61*	X

*Significant at the one per cent level of confidence.

problems for the second time using the method of analysis that had been designed. Coefficients of correlation between the first and second analysis were computed using the Spearman rho coefficient of correlation technique. The DuBois formula for tied ranks was used to eliminate some of the error involved with ranks that were tied.

The coefficients of correlation obtained for each judge appear in Table IV. Three out of four judges had a coefficient of correlation between their first and second analysis above .85. Judge "D" had a coefficient of .79. All coefficients were significant at the one per cent level of confidence. The coefficients of correlation obtained for the four judges were accepted as being evidence of a reliable method of analysis.

TABLE IV
CORRELATION COEFFICIENTS OBTAINED FOR
THE RELIABILITY OF THE METHOD
OF PROBLEM ANALYSIS

N = 20

Judge	r
A	.94*
B	.93*
C	.88*
D	.79*

*Significant at the one per cent level of confidence.

Collection of Data

The four subjects used for the study were in two different physical education groups. Two of the subjects had physical education on Tuesday and Wednesday from 10:00 to 10:20 o'clock and two subjects had physical education from 10:20 to 10:40 o'clock on Tuesday and Friday. The same physical education specialist taught both groups throughout the study. Both groups participated in the same type of lesson. Although the number of problems presented by the teacher differed for the two groups, the type of lesson and type of problem did not.

Two observers participated in the study from the preliminary observation period of five weeks to the end of the seven week period of observation. The observers observed one student per lesson. The observers rotated subjects with each lesson in order to help eliminate biases and increase the objectivity of the

observation and the data collected. Observers sat together on the side of the gymnasium. A problem recording sheet and a movement response sheet were provided for each lesson and for each subject.

The number of observations recorded for each subject ranged from ten to thirteen lessons, depending upon absences of the subjects and unanticipated interruptions in the physical education schedule. Activities included those with balls, with large equipment and with no equipment. The number of problems in each lesson ranged from three to eighteen and the total number of problems recorded for each subject ranged from forty-one to ninety-two.

At the conclusion of the observation period a meeting was arranged with the first grade teacher at the University Elementary School. The investigator was given access to school records. Height and weight records, I.Q. scores and school achievement records were checked. The investigator discussed with the first grade teacher the work habits, maturity, dependency, creativity, and social relationships of each child in other areas of the curriculum and their progress over the year. Since such information could have influenced an observer's reaction to a subject, it was not obtained until observations were completed. This information will be presented in Chapter V.

Treatment of Data

A case study approach was taken to the evaluation of the responses of the subjects to the movement problems presented during the observation period. Data for this study were not treated for statistical relationships or differences.

The movement responses of each subject were analyzed to determine the percentage of responses which fell into each of the behavioral categories described for each of the criteria. For the criteria of time, context and correctness, category one was considered the most desirable response. Responses that did not fall into this category were considered divergent responses. The proportion of divergent responses to limited and unlimited problems was determined and presented in chart form.

Percentages for the variety exhibited by each subject were determined. These were subjectively analyzed in relation to the limitation of the problem and in relation to the variety called for by a problem. This information has been presented with tables and graphs.

CHAPTER V

PRESENTATION AND INTERPRETATION OF FINDINGS

INTRODUCTION

The purpose of this study was to evaluate the movement responses of four first grade boys to teacher-stated movement problems. A tool for evaluating movement responses and a method for determining the limitation of a problem and the variety of responses called for by a problem were designed. Subjects were observed for a period of thirteen lessons or seven weeks.

Four criteria were used for the observation of movement responses. They consisted of:

1. time - the time the child spends on his interpretation of the problem out of the time allotted to him,
2. context - the ability to stay with relationships and combinations of movements,
3. variety - the number of different specific movement responses the child exhibits to a problem,
4. correctness - the correctness of the individual moves the child attempts in relation to what the problem demands.

Each criterion was divided into three or four behavioral categories. The ratings on these criteria constituted the observational data. Category descriptions appear in Appendix A.

Observational data were analyzed for each subject. Each criterion used for the evaluation of student movement responses was analyzed in terms of the percentage of the total number of responses which fell into each of the behavioral categories described for that criterion. For the criteria of time, context and correctness the first category was considered the most desirable behavior. Responses that did not fall into the most desirable category for each of these criteria were considered divergent responses. For the criterion of variety, the most desirable response was dependent on the variety of responses called for by a problem.

Movement problems were analyzed in terms of the degree of limitation of the problem and in terms of the variety of responses called for by a problem. A method of determining the limitation of a problem was designed and is described in Appendix B. A numerical value for the limitation of each problem was obtained using this method. A range from two to nineteen was obtained on the problems used in this study. An unlimited problem was considered one that accumulated a numerical limitation score from two to eight. A limited problem was considered one that accumulated a numerical limitation score above eight. The variety of responses called for by a problem was categorized into four groups. Category descriptions appear in Appendix B.

Divergent responses were analyzed to determine the percentage of divergent responses that were responses to limited problems and the percentage of divergent responses that were responses to unlimited problems. This analysis was done to give

some indication of whether or not the limitation of a problem was related in any way to the subject's deviation from desirable behavior.

The variety of responses exhibited by a subject to a problem was analyzed. These responses were also analyzed in relation to the limitation of a problem. This was done to give some indication of the effect a problem that called for a particular amount of variety in response had on the amount of variety exhibited by a subject. The variety of response exhibited by a subject was compared with the limitation of a problem to give some indication of the effect of limitation on the variety exhibited.

The presentation and interpretation of findings has been organized initially in the form of a case study for each subject. Background information provided by the classroom teacher and school records has been followed by an analysis of the responses of that subject. Data have been interpreted and a response profile has been presented for each subject.

The second section of the presentation and interpretation of findings consists of a presentation and interpretation of the similarities and differences among the four subjects used in this study.

SUBJECT #1

Background Information

Subject #1 was selected by the classroom teacher and the physical education specialist to be below the average in school

some indication of whether or not the limitation of a problem was related in any way to the subject's deviation from desirable behavior.

The variety of responses exhibited by a subject to a problem was analyzed. These responses were also analyzed in relation to the limitation of a problem. This was done to give some indication of the effect a problem that called for a particular amount of variety in response had on the amount of variety exhibited by a subject. The variety of response exhibited by a subject was compared with the limitation of a problem to give some indication of the effect of limitation on the variety exhibited.

The presentation and interpretation of findings has been organized initially in the form of a case study for each subject. Background information provided by the classroom teacher and school records has been followed by an analysis of the responses of that subject. Data have been interpreted and a response profile has been presented for each subject.

The second section of the presentation and interpretation of findings consists of a presentation and interpretation of the similarities and differences among the four subjects used in this study.

SUBJECT #1

Background Information

Subject #1 was selected by the classroom teacher and the physical education specialist to be below the average in school

achievement, maturity and motor ability. He was seven years and four months old at the start of the observation period. He was a heavy first grader, weighing seventy-one pounds with a height of forty-nine inches. He had an I.Q. of 112 and had been enrolled in the University Elementary School the previous year.

According to his classroom teacher, Subject #1 was a below average reader. Other academic areas reflected his inability to follow directions when he was required to read them. He generally stayed with his work and was said to be concerned and sensitive to achievement and almost afraid of failure. His behavior was immature with his peers in the classroom. He tended to be mature with the adults with whom he was working. Although he did not overtly seek relationships with his peers, Subject #1 seemed to be well liked. He was not considered particularly creative in his work in any areas of the curriculum.

Subject #1's weight made movements which required a great deal of agility or flexibility difficult. Although diagnosed as having below average motor ability, his improvement over the second semester of the school year would necessitate a re-evaluation of his ability.

Analysis of Movement Responses

The responses to eighty-four problems were recorded for Subject #1. Every problem did not have a context. Therefore, only sixty-nine problems were categorized for the criterion context. A complete categorical analysis for this subject appears in Figure 1.

N = 84 Time - the time the child spends on his interpretation of the problem out of the time available to him.

- 96% 1. Child works entire time available.
- 4% 2. Child works a large part of the time available.
- 0% 3. Child works a small part of the time available.
- 0% 4. Child does not work on the problem.

N = 69 Context - ability to stay with relationships and combinations of movements demanded by a problem.

- 67% 1. Child works within the entire context of the problem.
- 10% 2. Child works a part of the time within the entire context of the problem.
- 23% 3. Child at no time works within the entire context of the problem.

N = 84 Variety - the number of different specific movement responses the child exhibits to a problem.

- 25% 1. Child exhibits more than two different movement responses.
- 33% 2. Child exhibits two different movement responses.
- 42% 3. Child exhibits one movement response to the problem.
- 0% 4. Child does not respond to the problem.

N = 84 Correctness - the correctness of the individual moves the child attempts in relation to what the problem demands.

- 80% 1. Movement responses attempted are correct responses.
- 13% 2. Movement responses attempted are not all correct responses.
- 7% 3. Movement responses attempted are not correct responses.

FIGURE 1

CATEGORICAL ANALYSIS OF MOVEMENT RESPONSES
SUBJECT #1

Important relationships between criteria and between the responses and the problem are presented in Table V and Table VI and in Figures 2 and 3.

Time. The responses to eighty-four problems were recorded for Subject #1. For 96 per cent of those problems, Subject #1 worked on a solution for the entire time allotted to him. For 4 per cent of those problems he spent a large part of the time allotted to him actively involved in finding a solution. Three divergent responses for the criterion time were recorded for Subject #1. Because the number of responses which fell into divergent categories were so few, an analysis of them would not be meaningful for this subject. (See Figure 14, page 74)

Context. An analysis of the criterion context indicated that for 67 per cent of the problems recorded for Subject #1, he worked within the entire context of the problem. For 10 per cent of those problems he worked a part of the time within the entire context and for 23 per cent of those problems he did not work within the entire context of the problem.

Responses that indicated that Subject #1 did not work within the entire context of the problem were analyzed to determine whether or not the divergent responses were related to the limitation of the problem. Twenty-three divergent responses for the criterion context were recorded for this subject. Sixty-one per cent of the divergent responses were responses to unlimited problems and 39 per cent were responses to limited problems. (See Figure 2, page 41)

TABLE V

CATEGORICAL ANALYSIS OF THE VARIETY EXHIBITED
IN RELATION TO THE VARIETY CALLED
FOR BY A PROBLEM - SUBJECT #1

Child is asked to Explore a Variety of Solutions

More than two different responses	41%
Two different responses	41%
One response	18%
No responses	0%

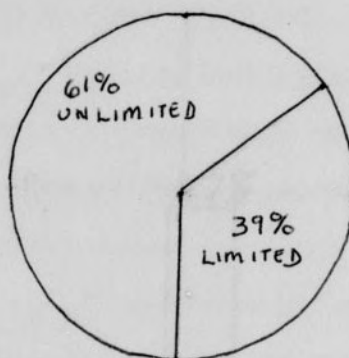
Child is asked to Find One Solution Out of Many
Possible Solutions

More than two different responses	13%
Two different responses	29%
One response	57%
No responses	0%

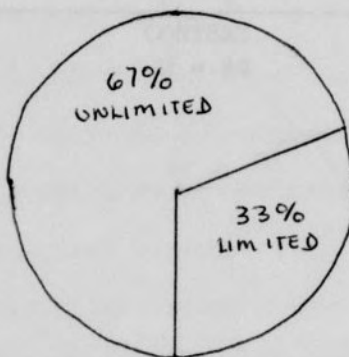
TABLE VI

THE VARIETY OF RESPONSES EXHIBITED TO
LIMITED AND UNLIMITED PROBLEMS
SUBJECT #1

Variety of Responses Exhibited	<u>Limited</u>	<u>Unlimited</u>
More than two	42%	58%
Two	32%	68%
One	52%	48%
None	0%	0%



CONTEXT
N = 23



CORRECTNESS
N = 15

FIGURE 2

PROPORTION OF DIVERGENT RESPONSES TO LIMITED
AND UNLIMITED PROBLEMS - SUBJECT #1

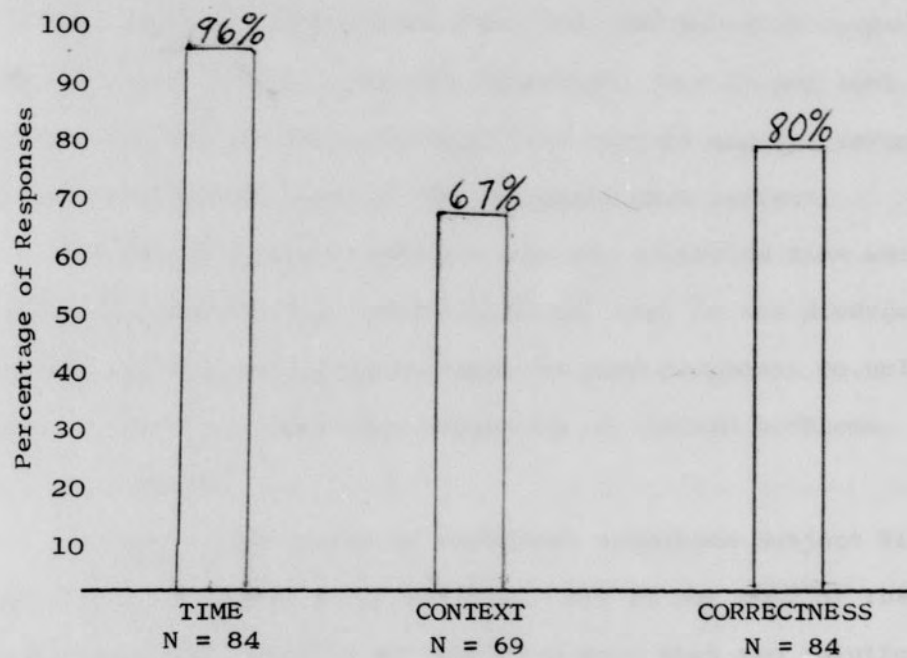


FIGURE 3

RESPONSES FALLING INTO THE MOST DESIRABLE
CATEGORIES - SUBJECT #1

Correctness. An analysis of the correctness of the individual movements attempted by Subject #1 to a problem showed that for 80 per cent of the problems recorded, the movement responses to that problem were all correct responses. For 13 per cent of the problems some of his responses were correct and for seven per cent of the problems none of the responses were correct.

Fifteen divergent responses for the criterion time were recorded for Subject #1. Sixty-seven per cent of the divergent responses for the criterion correctness were responses to unlimited problems and 33 per cent were responses to limited problems. (See Figure 2, page 41)

Variety. The number of different solutions Subject #1 exhibited to a problem were analyzed. For 25 per cent of the problems recorded, Subject #1 exhibited more than two solutions. For 33 per cent of the problems he exhibited two solutions and for 42 per cent of the problems he exhibited only one solution.

The variety exhibited by Subject #1 in his responses was compared to the variety of responses called for by a problem. (See Table V, page 40) Subject #1 exhibited more than two solutions to 41 per cent of the problems which called for a wide variety of solutions. He exhibited two different movement responses to 41 per cent of these problems and only one response to 18 per cent of these problems.

Subject #1 exhibited more than two solutions to 13 per cent of the problems which called for only one response, but inherently had many possible solutions. He gave two different

movement responses for 29 per cent of these problems and one response to 58 per cent of these problems. (See Table V, page 40)

The variety of responses exhibited by the Subject were analyzed in terms of the limitation of the problem. (See Table VI, page 40) Forty-two per cent of the problems for which Subject #1 exhibited more than two solutions were limited problems and 58 per cent were unlimited problems. Forty per cent of the problems for which he exhibited two solutions were limited and 60 per cent were unlimited. When problems for which he exhibited only one solution were analyzed, 52 per cent fell into a limited category and 48 per cent fell into an unlimited category.

Interpretation of Analysis of Movement Responses

The percentage of responses which fell into the most desirable categories for Subject #1 are presented in Figure 3, page 42. Subject #1 had a large percentage of his responses fall into the category of being involved the entire time he was allotted for a problem. He did not work with a great deal of enthusiasm, or at a rapid pace. He did work consistently and steadily and was not easily distracted from his work. At no time did he overtly seek teacher praise or recognition.

The percentage of responses that fell into the most desirable category for the criterion of context was not high for this subject. This criterion does not distinguish between the ability to combine movements (balance, roll, and then balance), and the

ability to stay with relationships between movements of a different kind (how many different balances can you do?). Comparatively, Subject #1 did have the ability to combine movements. A good many of the problems used in this study required the child to find different solutions to a problem. There was not a great deal of variety to his movement repertoire. This would partially explain why the evaluation of the criterion context was not high for this subject.

Subject #1 was concerned with the correctness of his solutions. Very rarely did he venture out of the limitations of a problem. Although he did not produce a great deal of variety in his responses, he did make an effort to complete correctly the problems that called for variety. (See Table VI, page 40) He seemed to respond better to problems that were limited in nature and did not give him a great deal of freedom of response. (See Figure 2, page 41)

The movements that Subject #1 chose were not difficult movements compared to the other members of the class. They were also not the most unique. For the most part, they were controlled. His ability to stay with a problem and not be distracted by other members of his class or by environmental influences contributed a great deal to his skill development over the second semester. He did not learn skills quickly but mastered them through a persistent effort.

SUBJECT #2

Background Information

Subject #2 was selected by the classroom teacher and the physical education specialist to have average maturity, average motor ability and to be an average school achiever. He was six years and eleven months old at the beginning of the observation period. He was a tall boy of fifty-one inches and weighed sixty-one pounds. Subject #2 had an I.Q. of 127 and had been enrolled in the kindergarten program of the University Elementary School the previous year.

According to his classroom teacher, Subject #2 had been doing below average work in reading at the beginning of the school year. By the second semester he was reading on an average level. He was described as a thoughtful boy and very sensitive to the needs of others. He was a little shy and timid but enjoyed playing roughly with his peers. Verbally, Subject #2 was mature. He had many friends. He worked slowly and very methodically in his academic work and very rarely guessed at an answer. He was not particularly creative in any areas of the curriculum.

Subject #2 had average motor ability. He did not seem particularly strong or weak in any areas of the physical education program.

Analysis of Movement Responses

Ninety-one problems were recorded for Subject #2. Seventy-four responses were categorized for context. A complete

categorical analysis appears in Figure 4. Important relationships between criteria and between the responses and the problems appear in Tables VII and VIII and Figures 5 and 6.

Time. For 88 per cent of the problems recorded for Subject #2 he worked the entire time allotted to him. For seven per cent of the problems he worked a large part of the time allotted to him and for two per cent of those problems only a small part.

For Subject #2 eleven divergent responses were recorded for the criterion time. The divergent responses were categorized into limited and unlimited problems and are presented in Figure 5. Eighty-two per cent of the divergent responses were responses to unlimited problems and 18 per cent were responses to limited problems.

Context. Out of seventy-four problems categorized for the criterion context, Subject #2 worked within the entire context of the problem for 59 per cent of those problems. For 30 per cent of the problems he was involved only a part of the time within the entire context of the problem and for 11 per cent of the problems he was at no time involved within the entire context of the problem.

Thirty divergent responses for the criterion context were recorded for this subject. Forty-three per cent of the divergent responses exhibited by this subject were to limited problems and 57 per cent were to unlimited problems. (See Figure 5, page 50)

Correctness. For 85 per cent of the problems categorized, the individual movement responses of Subject #2 were all correct

N = 91 Time - the time the child spends on his interpretation of the problem out of the time available to him.

- 88% 1. Child works entire time available.
- 7% 2. Child works a large part of the time available.
- 2% 3. Child works a small part of the time available.
- 3% 4. Child does not work on the problem.

N = 74 Context - Ability to stay with relationships and combinations of movements demanded by a problem.

- 59% 1. Child works within the entire context of the problem.
- 30% 2. Child works a part of the time within the entire context of the problem.
- 11% 3. Child at no time works within the entire context of the problem.

N = 91 Variety - the number of different specific movement responses the child exhibits to a problem.

- 25% 1. Child exhibits more than two different movement responses.
- 31% 2. Child exhibits two different movement responses.
- 43% 3. Child exhibits one movement response to the problem.
- 1% 4. Child does not respond to the problem.

N = 91 Correctness - the correctness of the individual moves the child attempts in relation to what the problem demands.

- 85% 1. Movement responses attempted are correct responses.
- 11% 2. Movement responses attempted are not all correct responses.
- 4% 3. Movement responses attempted are not correct responses.

FIGURE 4

CATEGORICAL ANALYSIS OF MOVEMENT RESPONSES
SUBJECT #2

TABLE VII

CATEGORICAL ANALYSIS OF THE VARIETY EXHIBITED
IN RELATION TO THE VARIETY CALLED
FOR BY A PROBLEM - SUBJECT #2

Child is asked to Explore a Variety of Solutions

More than two different responses	0%
Two different responses	57%
One response	43%
No responses	0%

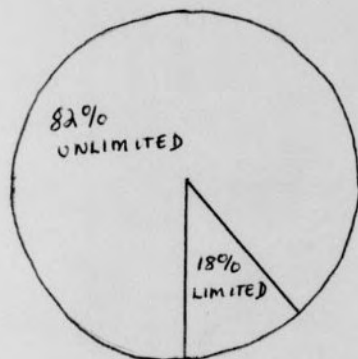
Child is asked to Find One Solution out of
Many Possible Solutions

More than two different responses	20%
Two different responses	24%
One response	55%
No responses	1%

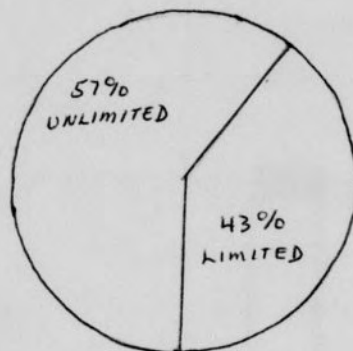
TABLE VIII

THE VARIETY OF RESPONSES EXHIBITED TO
LIMITED AND UNLIMITED PROBLEMS
SUBJECT #2

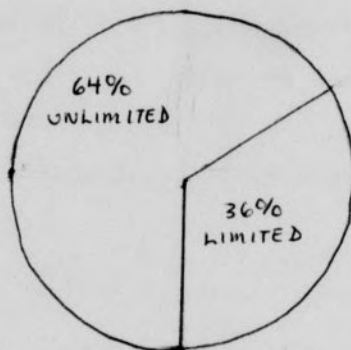
Variety of Responses Exhibited	<u>Limited</u>	<u>Unlimited</u>
More than two	40%	60%
Two	32%	68%
One	65%	35%
None	0%	0%



TIME
N = 11



CONTEXT
N = 30



CORRECTNESS
N = 14

FIGURE 5

PROPORTION OF DIVERGENT RESPONSES TO LIMITED
AND UNLIMITED PROBLEMS - SUBJECT #2

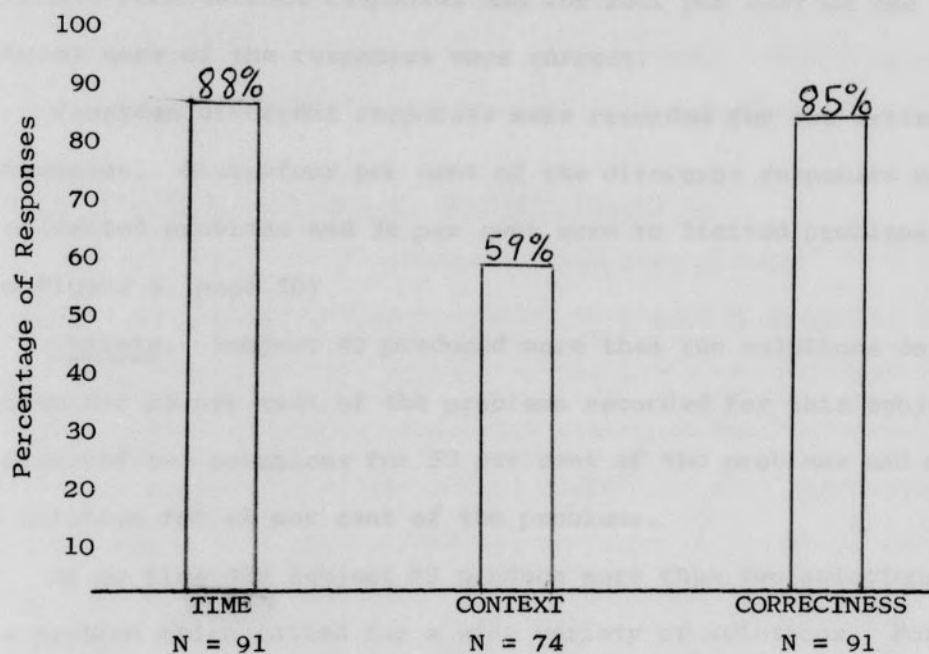


FIGURE 6

RESPONSES FALLING INTO THE MOST DESIRABLE
CATEGORIES - SUBJECT #2

solutions. For 10 per cent of the problems some of the individual movements were correct responses and for four per cent of the problems none of the responses were correct.

Fourteen divergent responses were recorded for the criterion correctness. Sixty-four per cent of the divergent responses were to unlimited problems and 36 per cent were to limited problems. (See Figure 5, page 50)

Variety. Subject #2 produced more than two solutions to a problem for 25 per cent of the problems recorded for this subject. He produced two solutions for 33 per cent of the problems and only one solution for 42 per cent of the problems.

At no time did Subject #2 produce more than two solutions to a problem which called for a wide variety of solutions. For 57 per cent of that type of problem, he produced two solutions and for 43 per cent of that type of problem only one response. (See Table VII, page 49)

Subject #2 exhibited more than two solutions to 20 per cent of the problems which called for only one response but inherently had many possible solutions. He exhibited two responses for 24 per cent of these problems and one response to 55 per cent of these problems. (See Table VII, page 49)

The variety of responses exhibited were analyzed in terms of the limitation of the problem. (See Table VIII, page 49) Sixty per cent of the problems for which Subject #2 exhibited more than two responses were limited problems and 40 per cent were unlimited problems. Thirty-two per cent of those problems for

which he exhibited two solutions were limited problems and 68 per cent were unlimited problems. Sixty-five per cent of those problems for which he exhibited one solution were limited problems and 35 per cent were unlimited problems.

Interpretation of Analysis of Movement Responses

The percentage of responses falling into the most desirable categories for Subject #2 is presented in Figure 6, page 51. One of the most characteristic aspects of the responses for Subject #2 was his concern for correctness. The classroom teacher's evaluation of this child as a "methodical worker" is most consistent with the categorical analysis of his movement responses in this respect.

Subject #2 never produced more than two different movement responses to a problem asking him to explore a variety of solutions. He did produce two different responses for a large percentage of these problems which might imply an effort to be correct. He did not seem to be comfortable with problems that gave him a great deal of freedom to choose his responses. He was slow in responding and ideas did not seem to come quickly.

Subject #2 became more enthusiastically involved with problems that were more of a self testing nature, such as, "See how far away from the wall you can be with your ball and still hit the wall?". This type of problem seemed to challenge him and cause him to work with more determination. The difference between divergent responses to limited and unlimited problems for this

subject would probably have been greater had it not been for his concern with correctness.

Subject #2 worked without becoming distracted by other members of the group or environmental influences. At no time did he seek teacher praise, nor was he ever a disrupting influence to other members of the class. The divergent responses of this subject seemed more closely related to not being involved than they did to being involved in other things. He was not unskilled but needed to be encouraged to work harder with movements he chose. He also needed to be encouraged to expand his movement repertoire.

SUBJECT #3

Background Information

Subject #3 was selected by the classroom teacher and the physical education specialist to be average in his school work, maturity and motor ability. At the beginning of the observation period he was six years and six months old and the youngest of the subjects. He was of average build, forty-five inches tall and weighed forty-three pounds. Subject #3 had an I.Q. of 108.

According to the classroom teacher, Subject #3 did average academic work. At the beginning of the school year he tended to be slightly immature but made tremendous improvement over the year. In the classroom he worked independently but slowly. He needed reassurance in his work. He got along very well with his peers and was probably the most sociable of the subjects.

During the observation period one child with whom he had formed a strong relationship had to be moved to a different group because the relationship was preventing Subject #3 from working independently. He tended to be more of a follower than a leader. He was not considered particularly creative in any areas of the curriculum.

Subject #3 was not particularly above or below what could normally be expected of a first grader in any of the areas of the physical education program.

Analysis of Movement Responses

The responses to forty-one problems were recorded for Subject #3. Thirty-six of those problems were categorized for the criterion context. A complete categorical analysis of the movement responses for Subject #3 appear in Figure 7. Important relationships between criteria and between his responses and the problem are presented in Tables IX and X and in Figures 8 and 9.

Time. Subject #3 spent the entire time allotted to him working on a solution to a problem for 77 per cent of the problems recorded for him. For 13 per cent of those problems he spent a large part of the time allotted to him working on a solution and for seven per cent of the problems he spent a small part of the time allotted to him. For three per cent of the problems Subject #3 did not work on the problem.

Seven divergent responses for the criterion of time were recorded for this subject. Fifty-seven per cent of these

N = 41 Time - the time the child spends on his interpretation of the problem out of the time available to him.

- 77% 1. Child works entire time available.
- 13% 2. Child works a large part of the time available.
- 7% 3. Child works a small part of the time available.
- 3% 4. Child does not work on the problem.

N = 36 Context - ability to stay with relationships and combinations of movements demanded by a problem.

- 49% 1. Child works within the entire context of the problem.
- 41% 2. Child works a part of the time within the entire context of the problem.
- 10% 3. Child at no time works within the entire context of the problem.

N = 41 Variety - the number of different specific movement responses the child exhibits to a problem.

- 43% 1. Child exhibits more than two different movement responses.
- 36% 2. Child exhibits two different movement responses.
- 21% 3. Child exhibits one movement response to the problem.
- 0% 4. Child does not respond to the problem.

N = 41 Correctness - the correctness of the individual moves the child attempts in relation to what the problem demands.

- 61% 1. Movement responses attempted are correct responses.
- 32% 2. Movement responses attempted are not all correct responses.
- 7% 3. Movement responses attempted are not correct responses.

FIGURE 7

CATEGORICAL ANALYSIS OF MOVEMENT RESPONSES
SUBJECT #3

TABLE IX
CATEGORICAL ANALYSIS OF THE VARIETY EXHIBITED
IN RELATION TO THE VARIETY CALLED
FOR BY A PROBLEM - SUBJECT #3

Child is asked to Explore a Variety of Solutions

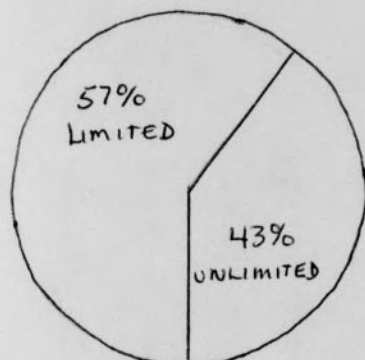
More than two different solutions	63%
Two different responses	12%
One response	25%
No responses	0%

Child is asked to Find One Solution Out of
Many Possible Solutions

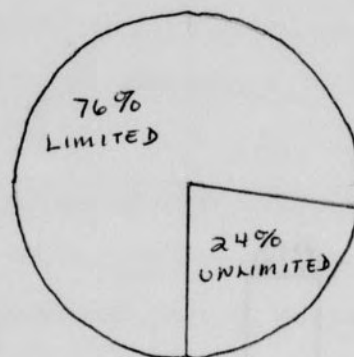
More than two different responses	45%
Two different responses	35%
One response	15%
No responses	5%

TABLE X
THE VARIETY OF RESPONSES EXHIBITED TO
LIMITED AND UNLIMITED PROBLEMS
SUBJECT #3

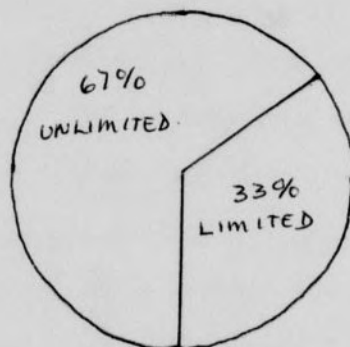
Variety of Responses Exhibited	<u>Limited</u>	<u>Unlimited</u>
More than two	17%	83%
Two	50%	50%
One	33%	67%
None	0%	0%



TIME
N = 7



CONTEXT
N = 21



CORRECTNESS
N = 12

FIGURE 8

PROPORTION OF DIVERGENT RESPONSES TO LIMITED
AND UNLIMITED PROBLEMS - SUBJECT #3

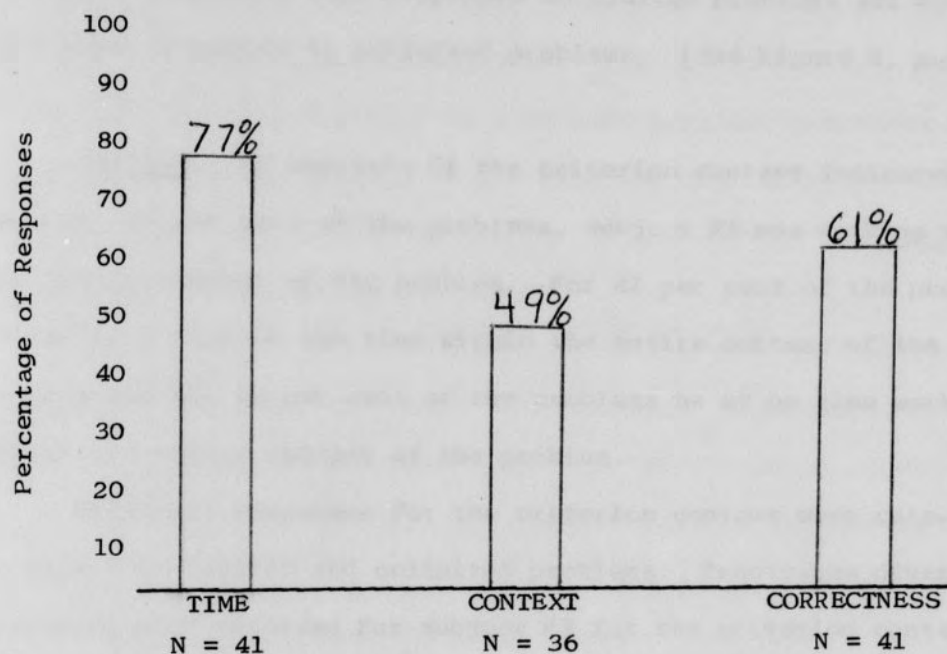


FIGURE 9

RESPONSES FALLING INTO THE MOST DESIRABLE
CATEGORIES - SUBJECT #3

divergent responses were responses to limited problems and 43 per cent were responses to unlimited problems. (See Figure 8, page 58)

Context. An analysis of the criterion context indicated that for 49 per cent of the problems, Subject #3 was working within the entire context of the problem. For 41 per cent of the problems he worked a part of the time within the entire context of the problem and for 10 per cent of the problems he at no time worked within the entire context of the problem.

Divergent responses for the criterion context were categorized into limited and unlimited problems. Twenty-one divergent responses were recorded for Subject #3 for the criterion context. Seventy-six per cent of these divergent responses were responses to limited problems and 24 per cent were responses to unlimited problems. (See Figure 8, page 58)

Correctness. An analysis of the correctness of the movement responses attempted for a problem indicated that for 61 per cent of the problem recorded for Subject #3, the movements attempted were all correct. For 32 per cent of these problems some of the movements attempted were correct and for seven per cent of the problems none of the movements attempted were correct.

For Subject #3 twelve divergent responses were recorded for the criterion correctness. Sixty-seven per cent of these divergent responses were responses to unlimited problems and 33 per cent were responses to limited problems. (See Figure 8, page 58)

Variety. The number of different solutions Subject #3 exhibited to a problem were analyzed. For 43 per cent of the problems recorded more than two different movement responses were exhibited. For 36 per cent of the problems two different movement responses were exhibited and for 21 per cent of the problems one movement response was exhibited.

The variety exhibited by Subject #3 was compared to the variety of responses called for by a problem. (See Table IX, page 57) Subject #3 exhibited more than two different movement responses to 63 per cent of the problems which called for an exploration of a variety of solutions. For 12 per cent of these problems he exhibited two different movement responses and for 25 per cent of these problems only one response.

Subject #3 exhibited more than two solutions to 45 per cent of the problems which called for only one solution but inherently had many possible solutions. For 35 per cent of these problems he exhibited two solutions and for 15 per cent of these problems one solution. (See Table IX, page 57)

The variety of responses exhibited by the Subject were analyzed in terms of the limitation of the problem. (See Table X, page 57) Eighty-three per cent of the problems for which Subject #3 exhibited more than two solutions were responses to unlimited problems. Seventeen per cent were responses to limited problems. Fifty per cent of the responses for which two different movements were exhibited were responses to limited problems and fifty per cent were responses to unlimited problems. When

problems for which he exhibited only one solution were analyzed 33 per cent were responses to limited problems and 67 per cent were responses to unlimited problems.

Interpretation of Analysis of Movement Responses

The percentage of responses falling into the most desirable categories is presented in Figure 9, page 59. Subject #3 had a comparatively low percentage of desirable responses for the criteria of time, context and correctness. The divergent responses of this subject to limited and unlimited problems do not clearly indicate that he worked better with a more structured or more unstructured problem. When problems were unlimited in nature giving him more freedom to choose his responses, his choices were not all correct choices. He exhibited a great deal of variety in his responses but found it most difficult to stay within the limits of a problem, even problems that were relatively unlimited.

Subject #3 was not particularly concerned with the correctness of his responses. He did not choose his responses deliberately nor did he ever really become involved in working on them deliberately. He did seem to respond better when the teacher redirected and encouraged his efforts but he did not seek the teacher's attention.

Subject #3 was very easily diverted from his work. He seemed to pay a great deal of attention to what other students were doing. He would often try to emulate the more advanced responses of other students but without a great deal of success.

He was not unskilled but did not particularly make an effort to control his movement.

Subject #3 was a young first grader. The University Elementary School was organized on a non-graded basis. He was in a physical education class of first and second graders. The fact that this child was in a class of more advanced first graders and second graders might have influenced his responses. This is especially true if the teacher's problems were designed to meet the needs of the majority of the group.

SUBJECT #4

Background Material

Subject #4 was selected by the classroom teacher and the physical education specialist to be above the average in school achievement, maturity and motor ability. He was six years and eight months old at the time of observation. He weighed forty-five pounds and had a height of forty-five inches. Subject #4 did not participate in the Kindergarten program of the University Elementary School. No I. Q. score was available for this subject. His school achievement indicated that it probably was above the average.

Academically Subject #4 was rated as being far superior to the average first grader. He was a sociable child who got along well with his peers and adults. Occasionally he had to be prodded to finish work but always produced superior work in the classroom.

He was felt to be extremely creative in all areas of the curriculum, especially in creative writing and art work.

The skill level of this child was also far above the average first grader in physical education. He could perform skills that most first graders could not and had a great deal of control in his movement. He tended to be dependent on teacher praise and seemed to do his best when he thought that someone was watching him.

Analysis of Movement Responses

The responses to fifty problems were recorded for Subject #4. Forty-two of those problems were categorized for the criteria context. A complete categorical analysis of the movement responses of Subject #4 appear in Figure 10. Important relationships between the criteria and between the problem and the movement response are presented in Tables XI and XII and in Figures 11 and 12.

Time. For 96 per cent of the fifty problems recorded for Subject #4 he spent the entire time allotted to him working on his interpretation of the problem. For four per cent of these problems he spent a large part of the time allotted to him working on the problem. Two divergent responses for the criterion of time were recorded for this subject. Because the number of divergent responses is so small an analysis of them in terms of the limitation of the problem would not be meaningful.

Context. Subject #4 worked within the entire context of the problem for 50 per cent of the problems that were recorded

N = 50 Time - the time the child spends on his interpretation of the problem out of the time available to him.

- 96% 1. Child works entire time available.
- 4% 2. Child works a large part of the time available.
- 0% 3. Child works a small part of the time available.
- 0% 4. Child does not work on the problem.

N = 42 Context - ability to stay with relationships and combinations of movements demanded by a problem.

- 50% 1. Child works within the entire context of the problem.
- 40% 2. Child works a part of the time within the entire context of the problem.
- 10% 3. Child at no time works within the entire context of the problem.

N = 50 Variety - the number of different specific movement responses the child exhibits to a problem.

- 58% 1. Child exhibits more than two different movement responses.
- 27% 2. Child exhibits two different movement responses.
- 15% 3. Child exhibits one movement response to the problem.
- 0% 4. Child does not respond to the problem.

N = 50 Correctness - the correctness of the individual moves the child attempts in relation to what the problem demands.

- 73% 1. Movement responses attempted are correct responses.
- 27% 2. Movement responses attempted are not all correct responses.
- 0% 3. Movement responses attempted are not correct responses.

FIGURE 10

CATEGORICAL ANALYSIS OF MOVEMENT RESPONSES
SUBJECT #4

TABLE XI

CATEGORICAL ANALYSIS OF THE VARIETY EXHIBITED
IN RELATION TO THE VARIETY CALLED
FOR BY A PROBLEM - SUBJECT #4

Child is asked to Explore a Variety of Solutions

More than two different solutions	53%
Two different responses	24%
One response	23%
No responses	0%

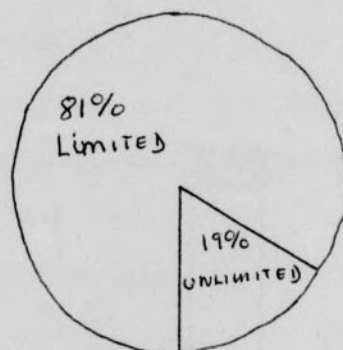
Child is asked to Find One Solution Out of
Many Possible Solutions

More than two different responses	46%
Two different responses	42%
One response	12%
No responses	0%

TABLE XII

THE VARIETY OF RESPONSES EXHIBITED TO
LIMITED AND UNLIMITED PROBLEMS
SUBJECT #4

Variety of Responses Exhibited	<u>Limited</u>	<u>Unlimited</u>
More than two	28%	72%
Two	38%	62%
One	57%	43%
None	0%	0%



CONTEXT

N = 21



CORRECTNESS

N = 13

FIGURE 11

PROPORTION OF DIVERGENT RESPONSES TO LIMITED
AND UNLIMITED PROBLEMS - SUBJECT #4

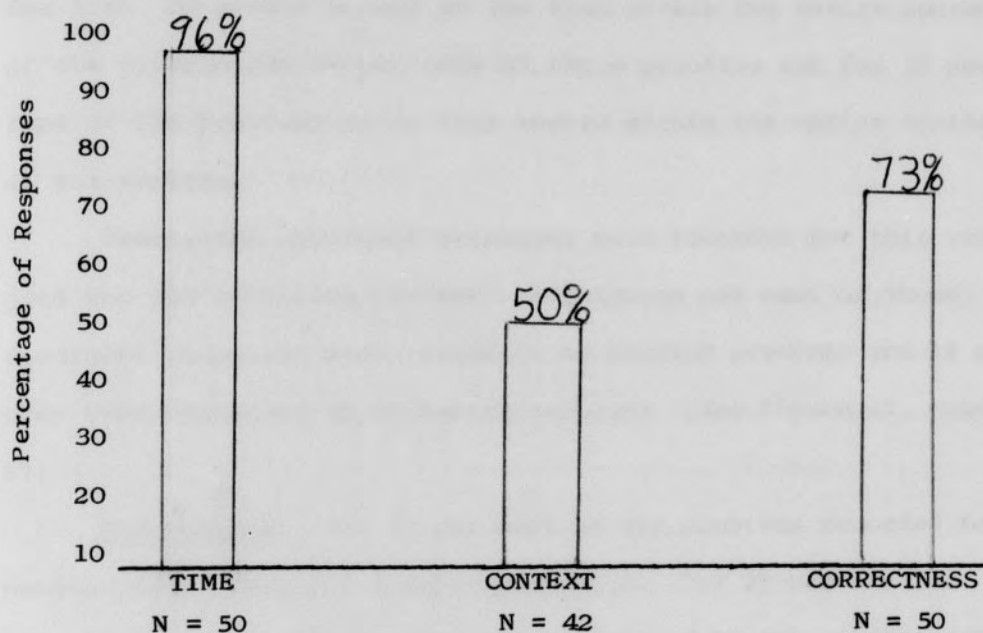


FIGURE 12

RESPONSES FALLING INTO THE MOST DESIRABLE
CATEGORIES - SUBJECT #4

for him. He worked a part of the time within the entire context of the problem for 40 per cent of those problems and for 10 per cent of the problems at no time worked within the entire context of the problem.

Twenty-one divergent responses were recorded for this subject for the criterion context. Eighty-one per cent of these divergent responses were responses to limited problems and 19 per cent were responses to unlimited problems. (See Figure 11, page 67)

Correctness. For 73 per cent of the problems recorded for Subject #4 he gave all correct responses. For 27 per cent of the problems some of the responses attempted by the subject were correct.

Thirteen divergent responses were recorded for Subject #4 for the criterion correctness. Eighty-five per cent of these divergent responses were responses to limited problems and 15 per cent were responses to unlimited problems. (See Figure 11, page 67)

Variety. The number of different solutions Subject #4 exhibited to a problem were analyzed. For 58 per cent of the problems recorded for this subject, he exhibited more than two solutions. For 27 per cent of the problems he exhibited two solutions and for 15 per cent of the problems one solution.

The variety of responses exhibited by Subject #4 was compared to the variety of responses called for by a problem. (See Table XI, page 66) For 53 per cent of the problems which

required an exploration of solutions Subject #4 exhibited more than two different movement responses. For 24 per cent of this type of problem he exhibited two responses and for 23 per cent he exhibited one solution.

Subject #4 exhibited more than two different movement responses to 46 per cent of the problems which called for only one solution but inherently had many possible solutions. He exhibited two different responses for 42 per cent of these problems and one solution to 12 per cent of these problems. (See Table XI, page 66)

The variety of responses exhibited by the subject were analyzed in terms of the limitation of the problem. (See Table XII, page 66) Seventy-two per cent of the problems for which Subject #4 exhibited more than two solutions were unlimited problems and 28 per cent were limited problems. Thirty-eight per cent of the problems for which he produced two different movement responses were limited and 68 per cent were unlimited problems. Fifty-seven per cent of the problems for which he produced only one response were limited problems and 43 per cent were unlimited problems.

Interpretation of Analysis of Movement Responses

The percentage of responses falling into the most desirable categories for Subject #4 is presented in Figure 12, page 68. Subject #4 was involved the total time on his interpretation of a problem for all but a small percentage of the problems. He

was a skilled first grader and approached the opportunity to move with a great deal of enthusiasm. At times his enthusiasm to begin working inhibited his attention to limitations imposed on his work.

Limited problems clearly gave this subject more difficulty. He gave all problems an initial effort, after which he returned to a small part of the problem or a particular skill that challenged him that was not related to the problem. He very rarely worked for any length of time at problems which required combinations of movements. He selected particular skills he had the desire to perfect and would work on perfecting them.

Subject #4 did produce a great deal of variety in his responses to problems. The evaluation of the criterion of correctness indicates that the variety he produced was not always desirable. His responses to individual problems did exhibit variety. An evaluation of his movement responses over the entire observation period would indicate that the variety of movement he actually experienced was not as great as the variety he exhibited to individual problems. He often returned to familiar skills.

Subject #4 seemed very dependent upon teacher praise and peer recognition. He always did his best when he thought that someone was watching him. He challenged himself, often outside the limitations of a problem. His variety of skilled movements would have increased a great deal more than it did if he had stayed within the limitations of the problems presented.

SIMILARITIES AND DIFFERENCES BETWEEN SUBJECTS

The similarities and differences between the responses of the four subjects used in this study have been presented in the following section. Statistical relationships have not been established. Similarities and differences have been presented on the basis of the information provided by the case studies of the four subjects. These similarities and differences are discussed and interpreted in the section following the presentation of this information.

Time

A comparison of the four subjects for the criterion of time is presented in Figure 13. For a large percentage of the problems all the subjects worked the entire time available. The relationship between the limitation of the problem and the divergent responses for the criterion time is presented in Figure 14. Subject #1 and Subject #4 did not have a large percentage of divergent responses to this criterion. The divergent responses of Subject #2 for the criterion time seemed very much related to the limitation of a problem. Eighty-two per cent of his divergent responses for this criterion were responses to unlimited problems. The divergent responses for Subject #3 fell primarily in limited problems but the difference was not great between limited and unlimited problems.

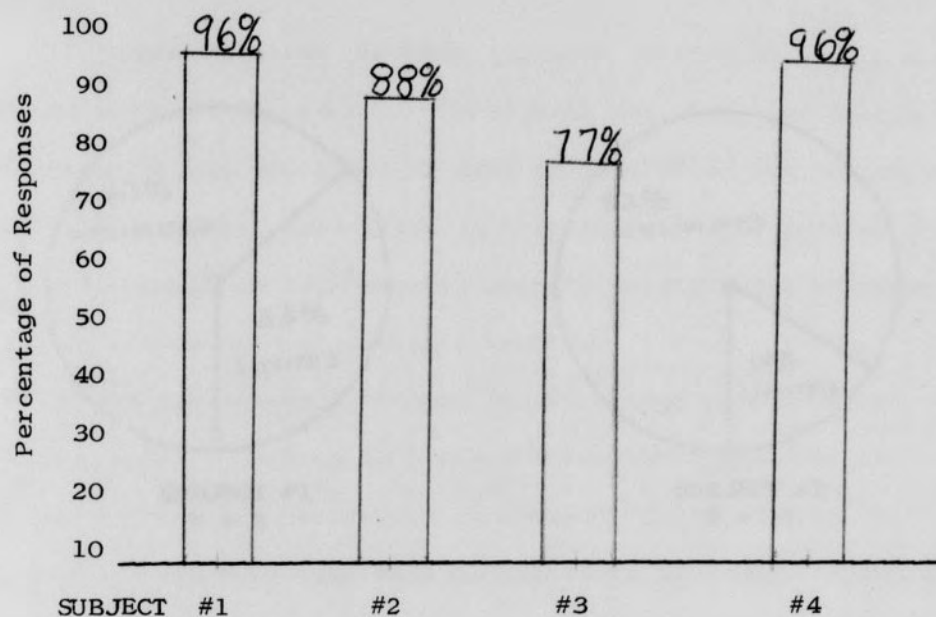
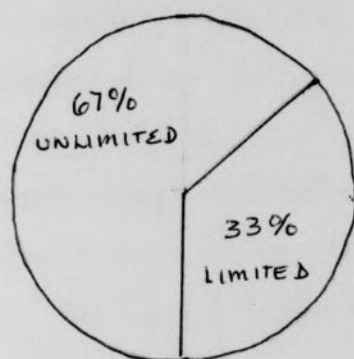
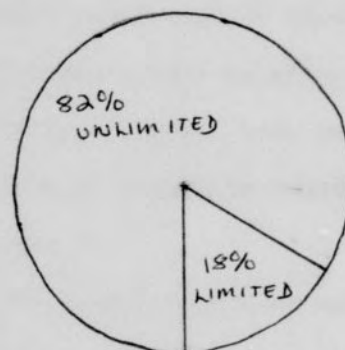


FIGURE 13

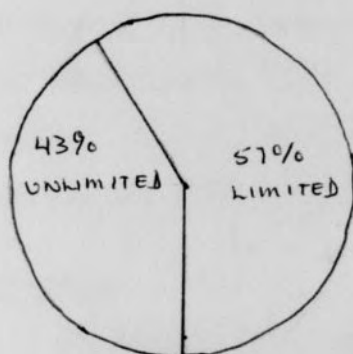
TIME - PERCENTAGE OF RESPONSES FALLING
INTO MOST DESIRABLE CATEGORY



SUBJECT #1
N = 3



SUBJECT #2
N = 11



SUBJECT #3
N = 7



SUBJECT #4
N = 2

Number of divergent responses for Subject #1 and Subject #4 not great enough for comparison.

FIGURE 14

TIME - PROPORTION OF DIVERGENT RESPONSES
TO LIMITED AND UNLIMITED PROBLEMS

Context

A comparison of the four subjects for the criterion context is presented in Figure 15. The highest percentage of divergent responses of all the subjects were for the criterion of context. Although there was some difference among subjects, none of the subjects seemed to have a great ability to stay with relationships between movements demanded by a problem.

The relationship between the divergent responses and the limitation of a problem is presented in Figure 16. For Subject #1 and Subject #2 the difference between the percentage of divergent responses that were responses to limited problems and the percentage of divergent responses that were responses to unlimited problems was not great. The divergent responses for these subjects fell more often than not as responses to unlimited problems. For Subject #3 and Subject #4 a large percentage of these responses fell as responses to limited problems.

Correctness

A comparison of the four subjects for the criterion of correctness is presented in Figure 17. All four subjects exhibited correct individual movements for a large percentage of the problems. The relationship of the divergent responses for the criterion of correctness to the limitation of a problem is presented in Figure 18. For all but Subject #4 the divergent responses were more often than not responses to unlimited problems. A large percentage of the divergent responses for Subject #4 were responses to limited problems.

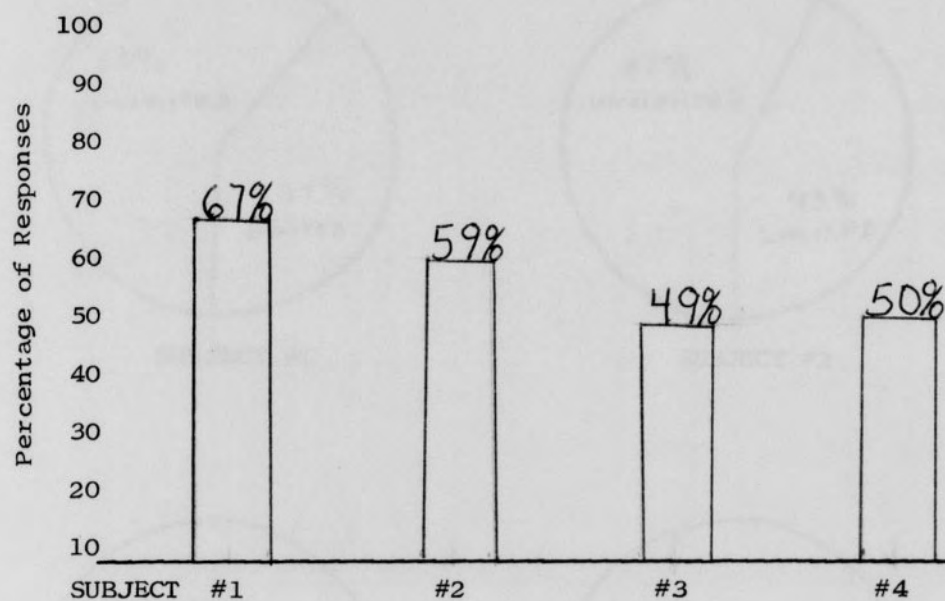
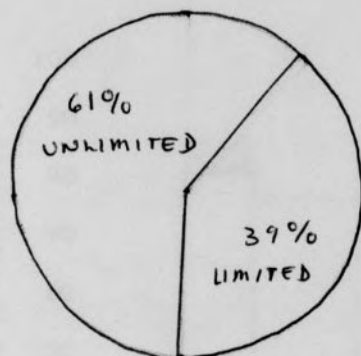
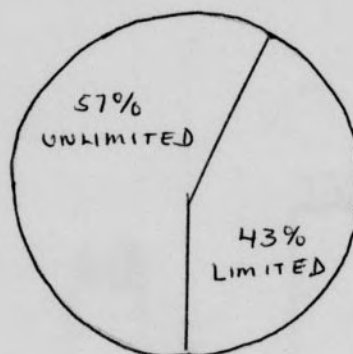


FIGURE 15

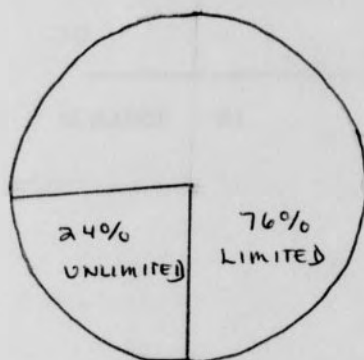
CONTEXT - PERCENTAGE OF RESPONSES FALLING
INTO MOST DESIRABLE CATEGORY



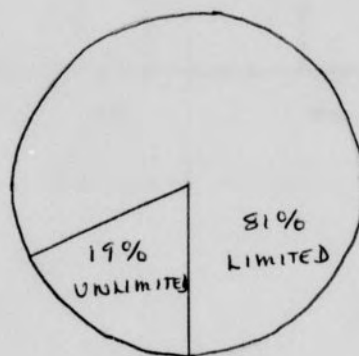
SUBJECT #1



SUBJECT #2



SUBJECT #3



SUBJECT #4

FIGURE 16

CONTEXT - PROPORTION OF DIVERGENT RESPONSES
TO LIMITED AND UNLIMITED PROBLEMS

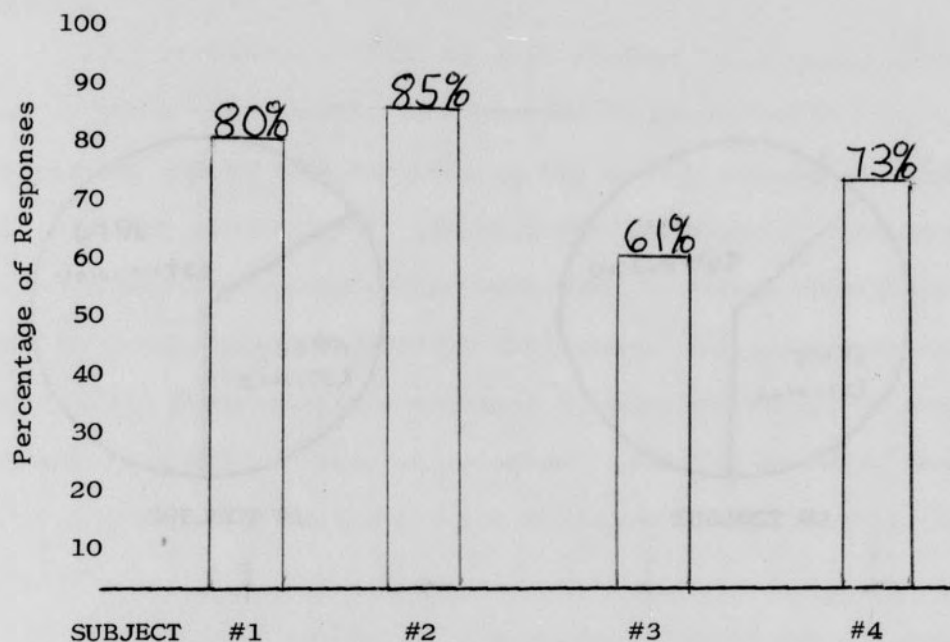
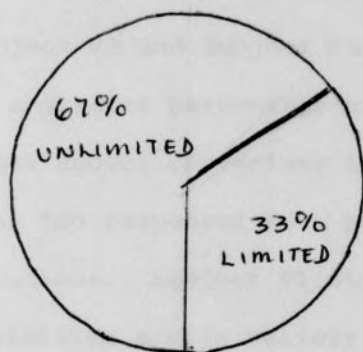
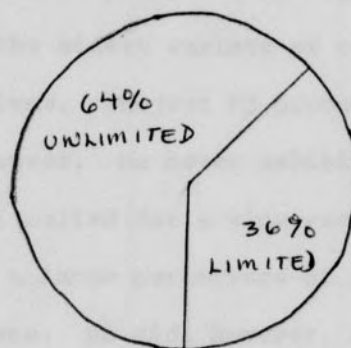


FIGURE 17

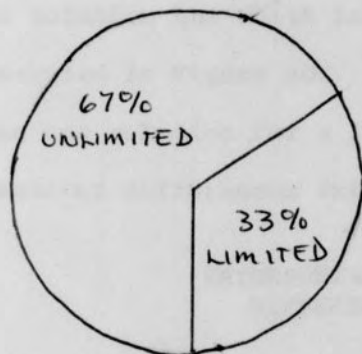
CORRECTNESS - PERCENTAGE OF RESPONSES FALLING
INTO MOST DESIRABLE CATEGORY



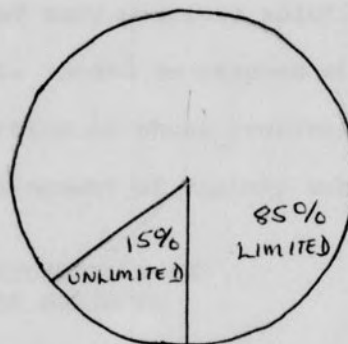
SUBJECT #1



SUBJECT #2



SUBJECT #3



SUBJECT #4

FIGURE 18

CORRECTNESS ■ PROPORTION OF DIVERGENT RESPONSES
TO LIMITED AND UNLIMITED PROBLEMS

Variety

The variety exhibited by each subject to problems which called for a wide variety of responses is presented in Figure 19. Subject #3 and Subject #4 produced the widest variety of responses to a greater percentage of the problems. Subject #2 produced the least amount of variety in his responses. He never exhibited more than two responses to a problem that called for a wide variety of solutions. Subject #1 did not have a large percentage of responses exhibiting a wide variety of solutions. He did, however, respond with more than one solution for a large percentage of this type of problem.

The variety exhibited to problems which called for only one solution but which inherently had many possible solutions is presented in Figure 20. All subjects tended to respond with more than one solution for a large proportion of these problems. Wide ranges of differences existed in the amount of variety exhibited.

INTERPRETATION OF SIMILARITIES AND DIFFERENCES BETWEEN SUBJECTS

All four subjects were involved in their interpretation of a problem the entire time allotted to them for a large percentage of the problems. This would seem to indicate that the problems were stimulating some kind of movement response for all of the subjects. The low percentage of desirable responses for the criterion of context would seem to indicate that the problems presented to these subjects demanded an ability to stay with

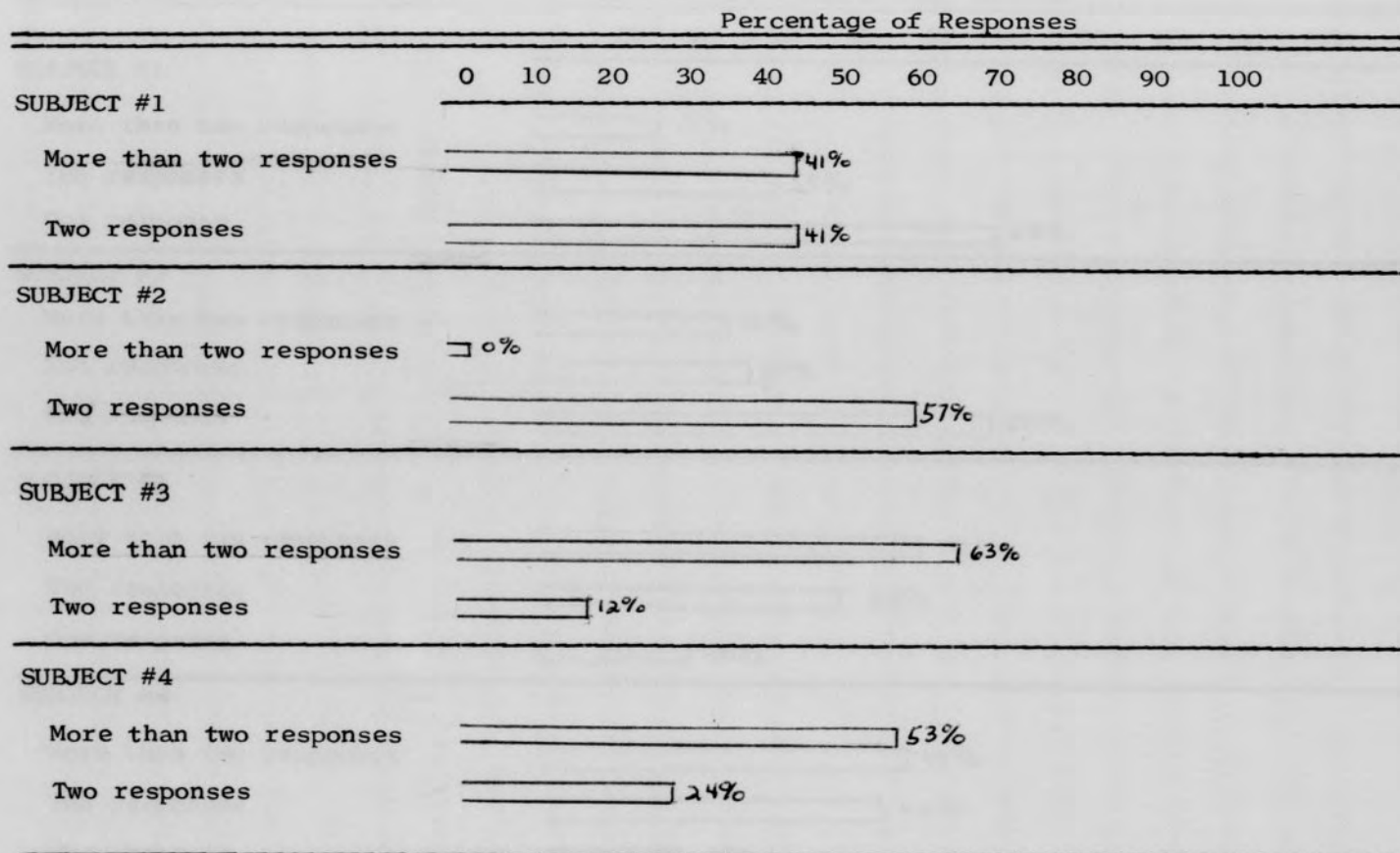


FIGURE 19

VARIETY EXHIBITED TO PROBLEMS CALLING FOR
A WIDE VARIETY OF RESPONSES

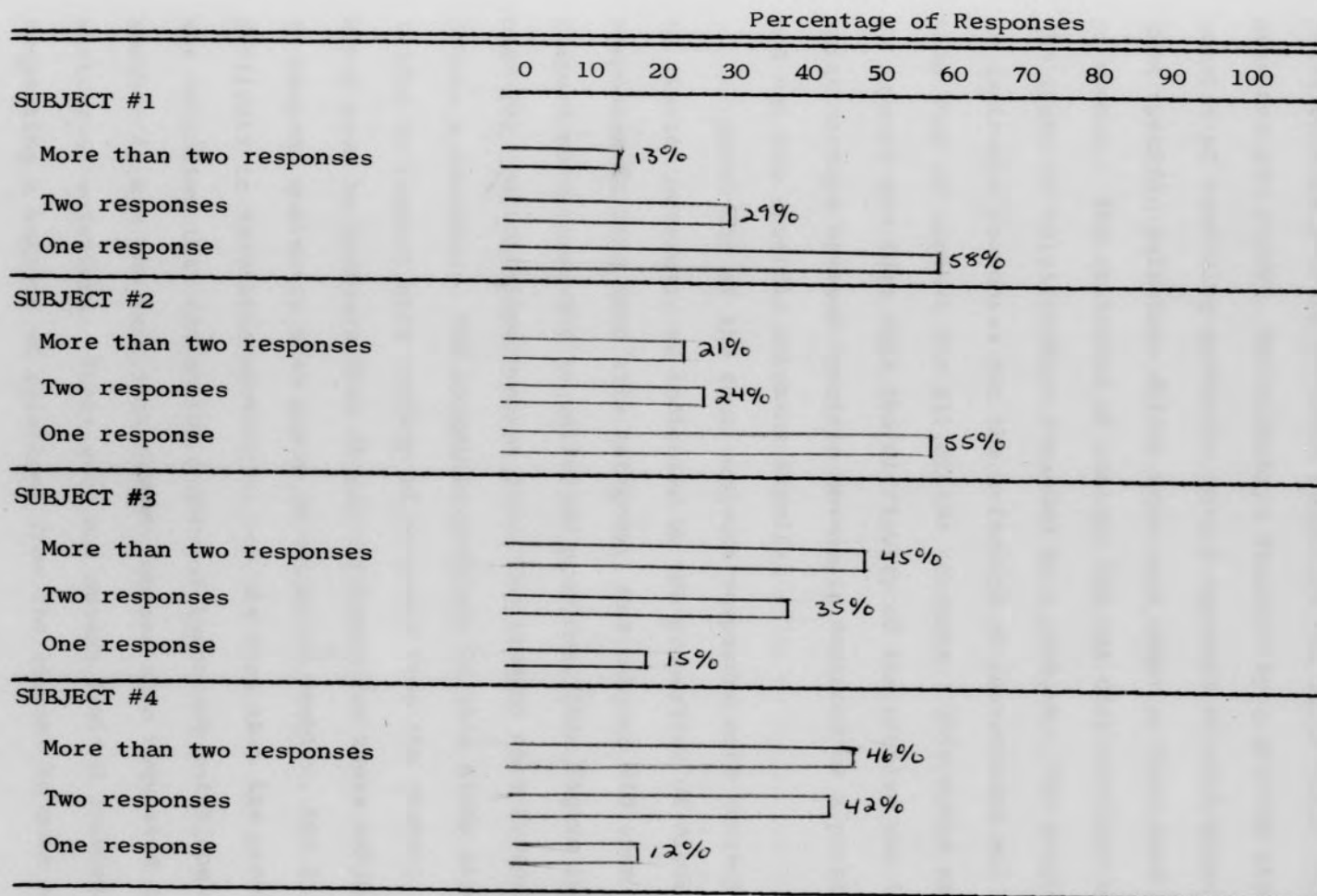


FIGURE 20

VARIETY EXHIBITED TO PROBLEMS CALLING FOR ONLY ONE
SOLUTION OUT OF MANY POSSIBLE SOLUTIONS

relationships between movement responses for which these subjects were not yet ready. Relationships demanded by a problem might consist of combining movements into a sequence or they might demand that specific solutions differ from each other or have some element in common. The criterion of context did not differentiate between the types of relationships demanded by a problem. The proportion of desirable responses for the criterion of correctness was higher than that of context for all of the subjects. This would seem to support the idea that the difficulty of the problem was in the relationships between specific movements demanded by a problem and not the specific movement itself.

Three out of the four subjects responded more correctly to limited problems, as indicated by the proportion of divergent responses falling into this category. One subject did seem to respond more correctly to unlimited problems. (See Figure 18, page 79) An unlimited problem gives the student more freedom to choose a response. The unlimited problems in this study also tended to request more variety of response from the student. This would seem to indicate that it was difficult for these subjects to respond correctly when given an unlimited problem, but it is difficult to determine whether it was the fact that the problem was unlimited that caused the number of incorrect solutions or whether it was the fact that these problems also requested a variety of solutions. There were not enough limited problems requesting a variety of solutions from the student to make a

comparison between limited and unlimited problems requesting a variety of solutions.

In this study the subjects who exhibited the least amount of variety in their solutions seemed the most concerned with correctness. There is a possibility that an over-concern for correctness might inhibit an exploration of solutions. Since the teacher will probably have students who show little concern for correctness in the same class with those who are over-concerned, it seems likely that a teacher's concern for correctness will almost have to be individualized. It also seems quite possible that the teacher will have to decide whether or not it is desirable to exhibit a variety of solutions to problems that do not call for a variety of solutions.

One of the interesting aspects of this study is the difference between the number and type of problem that was presented to each of the physical education groups. The University Elementary School was organized on a non-graded basis. Subject #1 and Subject #2 were in a physical education class that was a combination of students from the kindergarten and first grade. Subject #3 and Subject #4 were in a physical education group that was a combination first and second grade. Twice as many problems were presented to the first group (kindergarten and first grade) as were presented to the second group (first and second grade). Not only did the number differ but the type of problems differed. More limited problems were presented to the first group and more unlimited problems were presented to the second group.

The subjects who were presented with more limited problems responded better to limited problems as indicated by the proportion of divergent responses for these subjects which fell into an unlimited category. (Figure 14, page 74, Figure 16, page 77 and Figure 18, page 79) If the subjects in this study are any indication of the responses made by other members of both classes, then there seemed to be a recognition on the part of the teacher as to when to limit problems and when not to limit them.

All four subjects exhibited a great deal of variety in their responses to problems that required only one response but which inherently had many possible correct responses. (Figure 20, page 82) This would seem to indicate that either the teacher has not made it clear that one response is required and perhaps does not want to, or that the child will explore to some extent regardless of the problem. Subjects that exhibited the least variety in their movement and had the greater percentage of correct responses also exhibited the least amount of variety to this type of problem. (Figure 19, page 81)

Different subjects responded to the limitation of a problem in different ways. Two subjects seemed to respond better to limited problems as judged by the proportion of divergent responses to unlimited problems. (Figure 14, page 74, Figure 16, page 77 and Figure 18, page 79) One subject clearly responded with more desirable behavior to problems that were unlimited. For the subject who had the greatest number of divergent responses the limitation of the problem did not seem to affect his response

to it. The subjects who did not respond well to unlimited problems also tended to exhibit the least amount of variety in their solutions to problems and seemed more concerned with the correctness of their responses. The fact that the teacher presented more limited problems to the subjects who did not exhibit a wide variety of response to unlimited problems might be an indication of the teacher's desire to expand the movement experiences of the group of which these subjects were a part.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The purpose of this study was to evaluate the movement responses of four first grade boys to teacher-stated movement problems. A secondary purpose of this study was to design an objective and reliable tool for the observation of movement responses and to design an objective and reliable tool for the analysis of movement problems.

The study was conducted at The University Elementary School of The University of North Carolina at Greensboro over the second semester of the 1968-1969 school year. Four first grade boys were selected. Physical education classes in which these subjects were members were observed for a period of seven weeks or thirteen lessons. Two observers were used. Each observer was responsible for the observation of one subject per lesson.

A large part of this study consisted of determining the methods and the criteria for the observation of movement responses. A preliminary tool was designed and used for a trial observation period of five weeks or ten lessons. Weaknesses in the tool were made evident and a revised tool was designed and used for the collection of data. The tool was considered objective and reliable for the purposes of this study. The movement responses

of the subject were evaluated on four criteria:

1. Time - the time the child spends on his interpretation of the problem out of the time available to him,
2. Context - the ability to stay with relationships and combinations of movements demanded by a problem,
3. Variety - the number of different specific movement responses the child exhibits to a problem,
4. Correctness - the correctness of the individual moves the child attempts in relation to what the problem demands.

Each criterion was divided into three or four behavioral categories.

A tool was designed for the analysis of problems on two criteria: (a) the limitation of a problem and (b) the variety of response called for by a problem. Using this tool, problems were designated as either being limited or unlimited. They were also divided into four categories for the variety of response they called for from a student.

The findings of the study were presented in the form of a case study for each of the four subjects. The percentage of responses which fell into each behavioral category for each of the criterion were presented graphically for each subject. The criteria of time, context and correctness were designed so that one behavioral category was more desirable than the other categories. The writer was most interested in the responses that did not fall into the most desirable category, referred to as

divergent responses. The divergent responses were analyzed subjectively for each criterion to determine whether or not they were at all related to the limitation of a problem.

The criterion of variety, which provided a categorical analysis of the variety exhibited in the responses of the subjects, was compared to the variety of response called for by a problem. The evaluation of this criterion was also compared subjectively to the limitation of a problem to determine whether or not the variety exhibited by a subject in his responses was related to the limitation of a problem.

On the basis of this study the following conclusions were made:

1. All subjects worked the entire time available to them for a large percentage of the movement problems presented to them.
2. The evaluation of the criterion of context seemed to indicate that none of these subjects had a great ability to stay with relationships between movements in their responses that were demanded by problems.
3. All four subjects tended to produce more variety in their responses than was called for in problems that asked for only one solution, but inherently had many possible solutions.
4. Limited and unlimited problems, as defined in this study, affected subjects differently. Two subjects responded better to limited problems and one subject

responded better to unlimited problems. For one of the subjects the limitation of the problem did not seem to affect his response of it.

5. The subjects who produced more variety in their responses tended to respond better to unlimited problems.
6. The subjects who produced the least variety in their responses tended to be more concerned with the correctness of their solutions.
7. More variety of response was exhibited by all the subjects when problems were unlimited.
8. The tool designed for the evaluation of movement responses was objective and reliable.
9. The tool designed for the analysis of problems was objective and reliable.

CRITIQUE AND SUGGESTIONS FOR FURTHER STUDY

This study was designed as an initial investigation into the responses of the first grade child to movement problems. The number of subjects was limited so that more extensive and accurate information might be provided on these subjects. The results of this study are severely limited in their application to a larger population. Similar studies need to be conducted with a larger number of subjects of both sexes and in different situations.

The writer gained from this study an appreciation of the importance of observation to a movement education approach to elementary school physical education. Guiding the responses of students is dependent upon a knowledge of how students are

responding. The ultimate goal of studies such as this one should be to accumulate the knowledge needed to establish guidelines for the presentation of movement problems. Some aspects of the evaluation of the responses of the four subjects used in this study indicated wide differences in the needs of students. A knowledge of these differences within a class is dependent upon the teacher developing the ability to evaluate the responses of individuals. This is difficult when a teacher is not permitted an extended observation of each student from the sidelines, but a necessity if problems are to be presented to meet the needs of each student.

The use of the video tape recorder is highly recommended for future investigations in this area. In this study it was not possible to video tape all lessons. Doing so would have increased the reliability and objectivity of the findings and would have made it possible to increase the criteria for evaluation. The video tape recorder is also recommended to be used periodically by the teacher to observe the effect she is having on the responses of students in closer detail.

A secondary purpose of this study was to design an objective and reliable tool for the observation of the movement responses of the first grade child and to design an objective and reliable tool for the analysis of movement problems. An effort was made to design the tools used for this study so that they might be used in future studies or for other purposes of evaluation. The writer feels strongly that the reliability and objectivity of both tools increased with experience in using the tools. The manner in which

both tools were tested for statistical relationship between the judges also made both tools valid.

The tool designed for the evaluation of movement responses was found useful for the evaluation of the movement responses of the first grade child. The criterion of skill level, which was omitted from the revised tool, is still considered important to any evaluation of movement responses. Because defined and standardized movements are not often called for by a problem, evaluating this criterion is difficult to do objectively. The criterion of variety would provide more specific information if the categories used distinguished between correct and incorrect responses. Since all the subjects used in this study were involved with their interpretation of a problem the entire time allotted to them for such a large percentage of the problems, this criterion was not highly discriminating for these subjects, but probably would be in other situations. An evaluation of time spent working on correct solutions and time spent working on incorrect solutions would also be helpful.

The tool that was used for the analysis of movement problems was useful to the purposes of this study. More specific information on the complexity and the difficulty of problems needs to be added in future studies. That would distinguish between problems that are complex because of the way that they are verbally presented and problems that are difficult because of the combinations and relationships between specific movements that they demand of a child. An indication of the difficulty of the

specific movement required for limited problems might also be helpful.

A comparison of the responses of subjects to limited problems calling for a variety of solutions with unlimited problems calling for a variety of solutions seemed important to this study. A sufficient number of limited problems calling for a variety of solutions was not provided. In future studies it might be helpful to request from the teacher that more of a specific type of problem be presented.

All of the findings of this study need to be investigated by similar studies. Many questions regarding the responses of this age child to movement problems became evident during the course of the study. The following areas are deemed by the writer to be of particular concern for future investigations:

1. Will a first grade child exhibit a variety of solutions to a problem regardless of the variety requested by a problem?
2. Is there a definite relationship between a concern for the correctness of a response and the variety exhibited to a problem?
3. How complex can relationships between movements be for this age child?
4. What is the relationship between the complexity of the verbal presentation of a problem and the responses of students?
5. What is the effect of teacher concern for correctness on individuals?

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APPENDICES

APPENDIX A

CATEGORY DESCRIPTIONS FOR STUDENT MOVEMENT RESPONSES

Time - the time the child spends on his interpretation of the problem out of the time available to him.

1. Child works entire time available.
2. Child works a large part of the time available.
3. Child works a small part of the time available.
4. Child does not work on the problem.

Context - the ability to stay with relationships and combinations of movements demanded by a problem.

1. Child works within the entire context of the problem.
2. Child works a part of the time within the entire context.
3. Child at no time works within the entire context of the problem.

Variety - the number of different specific movement responses the child exhibits to a problem.

1. Child exhibits more than two different movement responses.
2. Child exhibits two different movement responses.
3. Child exhibits one movement response to the problem.
4. Child does not respond to the problem.

Correctness - the correctness of the individual moves the child attempts in relation to what the problem demands.

1. Movement responses attempted are correct responses.
2. Movement responses attempted are not all correct responses.
3. Movement responses attempted are not correct responses.

	TIME	1	2	3	4	CONTEXT	1	2	3	VARIETY	1	2	3	4	CORRECTNESS	1	2	3	
1.	X					X				X					X				
2.	X					X				X					X				
3.	X					X				X					X				
4.	X					X				X					X				
5.	X					X				X					X				
6.	X					X				X					X				
7.	X					X				X					X				
8.	X					X				X					X				
9.	X					X				X					X				
10.	X					X				X					X				
11.	X					X				X					X				
12.	X					X				X					X				
13.	X					X				X					X				
14.	X					X				X					X				
15.	X					X				X					X				
16.	X					X				X					X				
17.	X					X				X					X				
18.	X					X				X					X				
19.	X					X				X					X				
20.	X					X				X					X				

RATER _____

STUDENT _____

DATE _____

ACTIVITY _____

TIME _____

RECORDING SHEET FOR MOVEMENT PROBLEMS

1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
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10.									
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18.									
19.									
20.									

NAME _____ DATE _____

STUDENT _____ TIME _____

ACTIVITY _____ COMMENTS _____

APPENDIX B

ANALYSIS OF MOVEMENT PROBLEMS

Step 1 Root

- A. Underline the root or roots of the problem. The root of the problem is the verb that tells what movement is to be done. If a root is implied grammatically, insert it. Categorize the root into one of the following:

Point
Values

- 1) totally unspecified movement (complete freedom of any movement)
- 3) specified type of movement (freedom within a wide range of movements)
- 5) specified specific movement that allows variation of the basic movement
- 7) specified movement (no freedom to vary basic movement)

Examples of Categories

- 1) move, what can you do, work on something, make
- 3) travel, balance, stretch, twist, turn, swing, take weight, freeze
- 5) throw, catch, strike, roll, hit, jump, curl
- 7) run, walk, leap, skip, gallop

- B. Put down the point value for the category; if there are two roots take the average of the two.

Step 2 - Focus(s)

- A. Circle all the focuses of the problem. A focus is a word or words that describe how a movement is to be done.
- B. Add one point for each focus that allows a choice within that focus.

Add two points for every focus that does not allow a choice.

Examples

- 1 point - change speed, in different directions, on different parts of the body, different levels,

with a piece of equipment, on a piece of equipment

2 points - on your hands, slowly, on a low level, in a specific direction, in the air, with a specific piece of equipment

Step 3 - Combinations

- A. Roots of combinations have already been averaged. If a problem has more than one root, add one point for each combination of the same movement and two points for each combination of different movements. A different movement must have a different root.

Step 4

- A. Add the total number of points from each category to get the limitation of a problem.

Step 5 - Variety Called For

Categorize the variety called for in a problem according to the following categories:

1. child is asked to explore a variety of solutions
2. child is asked to find two solutions
3. child is asked to find one solution - many solutions possible
4. child is asked to find one solution - one solution possible.

NOTE: If the child is given a choice of two problems, take average of two problems.

EXAMPLES OF PROBLEM ANALYSIS

1. How many (different ways) can you travel (taking weight on your arms)?

Root - 3
Focus - 2 + 1
Combin. - 0

6 Total limitation
1 Variety called for

2. See how (smoothly) you can travel (taking the weight on different parts) of your body (changing these parts as you travel).

Root - 3
Focus - 2 + 1 + 1
Combin. - 2

9 Total limitation
1 Variety called for

3. Move (on your feet) (at the drum) freeze into (an interesting shape).

Root - 3 + 1 = 2
Focus - 2 + 2 + 1 = 5
Combin. - 2

9 Total limitation
3 Variety called for

4. Move as many (different ways) as you can think of.

Root - 1
Focus - 1
Combin. - 0

2 Total limitation
1 Variety called for

5. Try (different ways) of throwing (the bean bag) so you can catch it.

Root - 5 + 5 = 5
Focus - 1 + 1 = 2
Combin. - 2

9 Total limitation
1 Variety called for

6. (Against the wall) try throwing (it) (fast) and then throw (very slowly).

Root - $3 + 3 = 5$
Focus - $2 + 2 + 2 = 6$
Combin. - 1

12 Total limitation
3 Variety called for

Date _____

Name _____

1. How many different ways can you think of to cover space moving?

Root _____
 Focus _____
 Combin. _____

Total Lim. _____

Variety _____

2. Move any way as fast as you can, when you hear the drum freeze into any shape.

Root _____
 Focus _____
 Combin. _____

Total Lim. _____

Variety _____

3. Move a different way, freeze into a different shape.

Root _____
 Focus _____
 Combin. _____

Total Lim. _____

Variety _____

4. This time let's see everybody skip.

Root _____
 Focus _____
 Combin. _____

Total Lim. _____

Variety _____

5. Find a space and toss the ball so you can catch it.

Root _____
 Focus _____
 Combin. _____

Total Lim. _____

Variety _____

6. Throw it in the air so you can watch it and catch it before it bounces.

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

7. Can you move around the space with your ball in control?

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

8. Find something you need to work on.

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

9. Stretch to the ceiling.

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

10. Can you take the weight on your arms and stretch?

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

11. Think of two other parts you could balance on.

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

12. What can you do with either 2, 3, or 4 parts on the box?

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

13. Do something on your hands with a stretch.

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

14. What can you do to take a lot of weight on your hands and make your body stretch?

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

15. Who can change their level - doing something on your hands with a stretch.

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

16. How many different ways can you travel on your feet?

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

17. Can you do a three point balance and slowly change into another?

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

18. Work on rolling with a tight curl.

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

19. Can you skip with your knees high?

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____

20. On the equipment try to take weight on different parts of your body.

Root _____
 Focus _____
 Combin. _____
 Total Lim. _____
 Variety _____